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Ontario - Legislative Assembly

SESSIONAL PAPERS

VOL. XLIX.—PART V.

THIRD SESSION

OF THE

FOURTEENTH LEGISLATURE

OF THE

PROVINCE OF ONTARIO

SESSION 1917

TORONTO:

Printed and Published by A. T. WILGRESS, Printer to the King's Most Excellent Majesty
1917

148750
24/2/19



Printed by
WILLIAM BRIGGS,
Corner Queen & John Sts.,
Toronto.


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- No. 11 Report of the Registrar of Friendly Societies for the year 1916. Presented to the Legislature, April 6th, 1917. *Printed.*
- No. 12 Loan Corporations' Statements, being Financial Statements made by Building Societies, Loan Companies, Loaning, Land and Trust Companies for the year 1916. Presented to the Legislature, April 6th, 1917. *Printed.*

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- No. 15 Report of the Department of Public Highways for the year 1916. Presented to the Legislature, April 6th, 1917. *Printed.*
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- No. 22 Report upon the Hospitals for the Insane for the year 1916. Presented to the Legislature, April 6th, 1917. *Printed.*
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- No. 24 Report upon the Feeble-Minded of the Province for the year 1916. Presented to the Legislature, April 6th, 1917. *Printed for distribution.*
- No. 25 Report upon the Hospitals and Charities of the Province for the year 1916. Presented to the Legislature, April 6th, 1917. *Printed.*
- No. 26 Report upon the Prisons and Reformatories of the Province for the year 1916. Presented to the Legislature, April 6th, 1917. *Printed.*
- No. 27 Report upon the Neglected and Dependent Children of the Province for the year 1916. Presented to the Legislature, April 6th, 1917. *Not Printed.*
- No. 28 Report upon the operation of the Liquor License Acts in the Province for the year 1916. Presented to the Legislature, March 2nd, 1917. *Printed.*
- No. 29 Report of the Department of Agriculture for the year 1916. Presented to the Legislature, April 6th, 1917. *Printed.*
- No. 30 Report of the Ontario Agricultural College and Experimental Farm for the year 1916. Presented to the Legislature, April 6th, 1917. *Printed.*
- No. 31 Report of the Ontario Veterinary College for the year 1916. Presented to the Legislature, April 6th, 1917. *Printed.*
- No. 32 Report of the Ontario Agricultural and Experimental Union for the year 1916. Presented to the Legislature, April 6th, 1917. *Printed.*
- No. 33 Report of the Ontario Corn Growers' Association for the year 1916. Presented to the Legislature, April 6th, 1917. *Printed.*
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| No. 60 | Return to an Order of the House of April 19th, 1916, that there be laid before the House:—A Return shewing, 1. If the T. & N. O. Railway quoted any special rate not authorized by its tariff or has been a party to the quotation of a special rate from any point or points in Ontario or Western Canada. 2. If so, to what shipper or shippers has such rate been given. Presented to the Legislature, February 20th, 1917. Mr. Munro. <i>Not Printed.</i> |
| No. 61 | Copies of Orders-in-Council made under the authority of the Department of Education Act, or of the Acts relating to Public Schools, Separate Schools or High Schools. Presented to the Legislature, February 20th, 1917. <i>Not Printed.</i> |
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| No. 63 | Return of an Address to His Honour the Lieutenant-Governor of the 16th February, 1917, praying that he will cause to be laid before this House, a Return:—1. Shewing all correspondence |

(including telegrams) since January 1st, 1916, passing between the Government of the Province of Ontario or any member, officer or official thereof, and the Government of the Dominion of Canada and any officer or official thereof in reference to the machine guns purchased out of the moneys of the Province of Ontario. 2. All correspondence since January 1st, 1916, passing between the Government of the Province of Ontario, or any member, officer or official thereof, and the Imperial Government, and any officer or official thereof, in reference to machine guns purchased out of the moneys of the Province of Ontario. Presented to the Legislature, March 1st, 1917. Mr. *Bowman*. *Not Printed*.

- No. 64 Return to an Order of the House of the 26th February, 1917, for a Return shewing;—1. How many charters or licenses have been issued to racing associations operating in Ontario since the year 1912. 2. What are the names of the racing associations or companies and the dates of the issue of the licenses or charters respectively. Presented to the Legislature, March 1st, 1917. Mr. *Carter*. *Printed*.
- No. 65 Return to an Address to His Honour the Lieutenant-Governor of the 11th April, 1916, praying that he will cause to be laid before this House a Return shewing:—1. Copies of all letters or telegrams, since the 1st January, 1915, which have passed between the Government or any official or agent thereof, and the International Nickel Company or the Canadian Copper Company or any officers or officials thereof, in reference to the damages done to the property of the farmers and others interested in the lands adjacent to the plant of the Canadian Copper Company. 2. Of all letters and telegrams which have passed between the Government, or any officer or official thereof—and particularly the Departments of Lands, Forests and Mines and of Agriculture—and Mr. Chas. McCrea, M.P.P., of Sudbury, in reference to the matters aforesaid or the operations of the International Nickel Company or the Canadian Copper Company, and the damage being done to the property in the vicinity of the operations of the said companies; and particularly the correspondence between either of the Departments and Mr. McCrea and Mr. Ponton and Mr. Jarvis, Valuers for the Canadian Copper Company. 3. Of all Orders in Council withdrawing lands from sale for agricultural purposes, at the instance or suggestion of the Canadian Copper Company. Presented to the Legislature, March 2nd, 1917. Mr. *Carter*. *Printed*.
- No. 66 Return to an Order of the House of the 19th February, 1917 for a Return shewing how many patients were regularly cared for in the Whitby Asylum during the year 1916. Presented to the Legislature, March 2nd, 1917. Mr. *Wigle*. *Printed*.

- No. 67 Return to an Order of the House of the 23rd February, 1917, for a Return of copies, 1. Of the pay-rolls of the Industrial Department of the Reformatory for the Province of Ontario, commencing November 1st, 1915, and ending October 31st, 1916, specifying the nature of the services rendered by those whose names appear in the Return. 2. Of the monthly payments by the Industrial Department of the Reformatory for the Province of Ontario to persons whose names do not appear upon the monthly pay-roll of the Industrial Department, specifying the nature of the services rendered by those whose names appear in the Return. Presented to the Legislature, March 2nd, 1917. Mr. Bowman. *Not Printed.*
- No. 68 Return to an Order of the House of the 3rd April, 1916, for a Return shewing: 1. The number of acres occupied by *bona fide* settlers on the lands purchased from the Government by Willis K. Jackson *et al.* under agreement bearing date the 14th day of June, 1912, particularizing the number of acres occupied each year since the date of the said agreement. 2. The number of settlers occupying such lands since the date of such agreement and the number respectively occupying the same for each year since the date of said agreement and the number of acres occupied by each settler. 3. The number of settlers who have lived up to the requirements of The Free Grant and Homestead Act and the regulations thereunder, and the number in default. 4. The number of farms required to be cleared by the Minister under Clause 4 of said agreement, and the actual number of such farms cleared, the amount of work performed, and the number and kind of buildings erected in accordance with the request of said Minister. 5. The number and extent of roads, bridges and other improvements, designating the nature of such improvements, required by the Minister to be done under Clause 5 of said agreement and the number and extent of such roads, bridges and other improvements completed in accordance with such request. 6. The number of schools and school buildings erected under Clause 6 of said agreement, and whether same are established and erected to the satisfaction of the Minister, also the location of such schools, particularizing those which are not satisfactory to the Minister and the reason for such dissatisfaction. 7. The amount of work required to be performed under Clause 7 of said agreement that has actually been performed, particularizing the nature and cost of such work, and the date each work was commenced and completed. 8. The number of acres cut over by the purchaser under Clause 8 of said agreement, and whether same cleared in accordance with the terms of said clause and to the satisfaction of the Minister; and whether the terms of said clause as to leaving 20 acres of wood for each farm have been complied with, and the kind of wood so left. 9. Whether all the timber cut by the purchaser has been manufactured in the townships of Kendry and Haggart,

and if not, the amount not so manufactured and the amount of timber disposed of outside of such townships, and to whom the same was sold. 10. The amount of timber that has been purchased from the settlers by the purchaser, and upon what terms were such purchases made; and how much and at what rate were the settlers paid for cutting and removing timber; and what was the rate charged to the settler for the use of the purchaser's teams. 11. The number and date of sales that have been made by the purchaser to settlers and the terms of such sales and copies of all agreements between such settlers and purchasers and as to whether the same have been approved of by the Minister. 12. The number of patents issued to settlers under Clause 13 of said agreement. 13. The extent of the lands upon which patents have been issued to the purchaser under Clause 14 of said agreement, and the nature and cost of the buildings built on same for which such patents granted. 14. All correspondence between the Government or any officer or official thereof and the purchaser or any of them, or any officer or official of such purchaser, and between the Government or any officer or official thereof and any settlers, relating to the whole or any part of the subject matter of the said agreement. Presented to the Legislature, March 6th, 1917. Mr. Lang. *Not Printed.*

No. 69 | Return to an Order of the House of the 16th February, 1917, for a Return shewing:—1. All statements furnished by the Canada Copper Company, International Nickel Company, Mond Nickel Company, and any other company producing nickel, under section 8 of The Mining Act, respecting taxation since the 1st of January, A.D. 1915. 2. All reports from any Government Mine Assessor, made under the provisions of The Mining Act, in respect to the mining operations of the Canada Copper Company, the International Nickel Company or the Mond Nickel Company, particularly with reference to the taxes to be paid by the said companies, or any of them, under The Mining Tax Act. 3. All correspondence since the 1st day of January, 1915, between the Minister of Lands, Forests and Mines, or the Provincial Treasurer, or any officer or official of the Government, and the Canada Copper Company, the International Nickel Company, the Mond Nickel Company, and any other companies producing nickel, or any officer or solicitor for or on behalf of the said companies, or any of them, with reference to the amount of taxes or royalties paid or to be paid by the said companies or any of them, to the Provincial Treasurer of the Province, in respect of the ore mined or the mining operations carried on by them in the Province of Ontario. Presented to the Legislature, March 16th, 1917. Mr. Carter. *Not Printed.*

No. 70 | Return to an Order of the House of the 9th March, 1917, for a Return shewing:—1. The number, kind and cost of buildings comprised in the Burwash Prison Farm property. 2. What is the number of acres of land belonging to or included in the Bur-

wash Prison Farm property, and of such land, how many acres are under cultivation, and how many acres are used for the purpose of pasture. 3. How many prisoners are there at Burwash Prison Farm. 4. What is the number of employees at the Burwash Prison Farm, and what is the amount of salary paid to each employee. 5. Were cattle or other animals shipped from the Burwash Prison Farm in the year 1916, and if so, what was the number so shipped, the total value of such shipments and the amount paid as freight charges thereon. 6. Were cattle or other animals brought to the Burwash Prison Farm from other places in the year 1916, and if so, what was the number so brought, and what were the names of the places from which said cattle or other animals were brought. Presented to the Legislature, March 16th, 1917. Mr. Mageau. *Printed.*

- No. 71 Return to an Order of the House of the 16th February, 1917, for a Return:—1. Shewing the names of all the Townsites established by the T. & N. O. Ry. Commission. 2. Shewing all the townsite lands sold by the T. & N. O. Ry. Commission on or after July 29, 1916, the towns in which they were situated, and the amounts received for each. Presented to the Legislature, March 20th, 1917. Mr. Bowman. *Not Printed.*
- No. 72 Copies of contracts with The Kinleith Paper Company, Limited, St. Catharines, Ontario; The Georgetown Coated Paper Mills, Limited, Georgetown; The Provincial Paper Mills Company, Limited, Toronto; authorized by Order in Council dated February 20th, 1917. Presented to the Legislature, March 21st, 1917. *Printed.*
- No. 73 Return to an Order of the House of the 19th February, 1917, for a Return shewing if the Canadian Northern Railway Company applied to the Minister of Lands, Forests and Mines to designate the lands or any part of the lands to be granted to the said railway as provided in section 3, 9 Edw. VII., chap. 71. 2. Has the Minister of Lands, Forests and Mines designated any such lands or any part of the same. 3. If such lands or any part of the same have been so designated, what is the total acreage so designated, and of what townships or part of townships does the same consist. 4. Have the said lands or any part of the same been surveyed. 5. If the said lands have not been so designated, why have they not been designated. Presented to the Legislature, March 21st, 1917. Mr. Davidson. *Printed.*
- No. 74 Return to an Order of the House of the 23rd February, 1917, for a Return shewing:—1. What amounts have been paid and upon what dates since January 1st, 1916, to the firm of Gunn, Richards and Company, Production Engineers and Public Accountants of 43 Wall Street, 43 Exchange Place, New York, or to any one acting for them, or on their behalf, on account of any

- Department of the Government. 2. What amounts, if any, are still owing to the said firm or any one acting for them or on their behalf. 3. What were the services rendered in respect to which such payments were made or liability incurred. 4. By what authority was the employment of the said firm authorized. Presented to the Legislature, March 21st, 1917. Mr. *Richardson*. *Not Printed*.
- No. 75 Return to an Order of the House of the 19th February, 1917, for a Return shewing:—1. The total capital expenditure to the end of the fiscal year for all purposes in respect to the Guelph Prison Farm. 2. Any further capital expenditures contemplated, and if so, to what amount. 3. How many prisoners, on the average, have been accommodated at the Guelph Prison Farm during the year 1916. 4. How many prisoners are now at the Guelph Prison Farm for offences against the criminal law. 5. What was the average number of prisoners at the Guelph Prison Farm during the year 1916 for offences against the criminal law. Presented to the Legislature, March 28th, 1917. Mr. *Ferguson (Kent.)* *Printed*.
- No. 76 Return to an Order of the House of the 28th March, 1917, for a Return shewing:—1. What was the total cost of the knitting plant installed at the Mercer Reformatory, Toronto. 2. From whom was such knitting plant purchased and what was the date of purchase. 3. When was the said knitting plant installed. 4. What amount was paid to operatives up to the 1st of March, 1917, for operating the said plant. 5. What is the value of the goods produced from the knitting plant. 6. Have the goods produced by the said plant been sold, and if so, to whom. Presented to the Legislature, March 29th, 1917. Mr. *Ferguson (Kent.)* *Not Printed*.
- No. 77 Return to an Address to His Honour the Lieutenant-Governor of the 19th February, 1917, praying that he would cause to be laid before this House a Return:—1. Of copies of all correspondence passing between the Government of this Province, or any member, officer or official thereof, and the Government of the Dominion of Canada, or any officer or official thereof, in reference to the care of Returned Soldiers. 2. Of all correspondence passing between the Government of this Province, or any member, officer or official thereof, and the Government of the Dominion of Canada, or any officer or official thereof, in reference to the establishment of Convalescent Homes for the care of Returned Soldiers. 3. Of all correspondence passing between the Government of this Province, or any member, officer or official thereof, and the Government of the Dominion of Canada, or any officer or official thereof, in reference to the relations between the Soldiers' Aid Commission and the Military Hospitals Commission of the Army Medical Service Corps. Presented to the Legislature, April 2nd, 1917. Mr. *Rowell*. *Not Printed*.

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| No. 78 | Return to an Order of the House of the 21st March, 1917, for a Return of copies: 1. Of all correspondence and documents at any time passing between the Director of Industries, Ontario Reformatory, and the Assistant Provincial Secretary, referring to Alexander McPherson, foreman, Ontario Reformatory Industries, and Fred. W. French, Assistant Director of Ontario Reformatory Industries, or either of them, or relating to any matters arising between the said Alexander McPherson and Fred. W. French. Presented to the Legislature, April 2nd, 1917. Mr. <i>Richardson</i> . <i>Not Printed</i> . |
| No. 79 | Copies of all Orders-in-Council made under the authority of the Department of Education Act or of the Acts relating to Public Schools, Separate Schools or High Schools, passed since the opening of the present Session of the Legislative Assembly. (<i>See No. 61.</i>) Presented to the Legislature, April 2nd, 1917. <i>Printed</i> . |
| No. 80 | Return to an Order of the House of the 30th March, 1917, for a Return shewing: 1. What has been the cost of the Ontario Nickel Commission since the 1st day of February, 1917: (<i>a</i>) For salaries or payments by way of remuneration or honorarium to each member of the Commission respectively; (<i>b</i>) For travelling expenses of each member of the Commission respectively; (<i>c</i>) For allowance in lieu of travelling expenses to each member of the Commission respectively; (<i>d</i>) For other purposes, specifying such purposes and amounts. 2. What honorarium, remuneration or salary is payable or to be paid to the members of the Commission other than G. T. Holloway. 3. Is the Chairman, G. T. Holloway, still in the Government employ at \$20,000 per year and \$10.00 per day in lieu of travelling expenses, and if so when will the obligation of the Government cease. 4. Are the travelling expenses of the said G. T. Holloway from Toronto to Great Britain to be paid by the Government in addition to the allowance made to him. 5. What were the services rendered by each of the following parties in respect of which payments were made to them for salary as shown in the Return of the 16th February, 1916, respectively: Professor George A. Guess, salary, \$1,250; F. Clithero, salary, \$388.54; G. W. Dixon, salary, \$359.03; A. L. Clark, salary, \$600.00; R. N. Dickson, salary, \$485.00; A. Stanfield, salary, \$200.00; E. M. Tozer, salary, \$306.60; E. A. Wilson, salary, \$210.73. Presented to the Legislature, April 4th, 1917. Mr. <i>Dewart</i> . <i>Not Printed</i> . |
| No. 81 | Return to an Order of the House of the 19th March, 1917, for a Return of copies of all correspondence between the Government of Ontario or any Member, officer or official thereof, and the Devonshire Race Track Company or any member, officer or official thereof, and in particular the correspondence between J. T. White, Esq., Solicitor to the Department of the Provincial Treasurer, and Hon. Dr. Reaume. Presented to the Legislature, April 4th, 1917. Mr. <i>Wigle</i> . <i>Not Printed</i> . |

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| No. 82 | Return to an Order of the House of the 28th March, 1917, for a Return of:—1. Copies of: (1) Charter of the Gore Bay Riding and Driving Association. (2) Supplementary Letters Patent, dated 17th November, 1915, increasing capital stock to \$25,000, and changing name to “Northern Riding and Driving Association.” (3) Supplementary Letters Patent, dated 12th February, 1916, increasing capital stock to \$200,000. 2. Copies of all annual returns made by the said company. 3. Copies of all correspondence, and documents filed with the Government on the application for the issue of said Supplementary Letters Patent. 4. Copies of application for license to the Provincial Treasurer, and all correspondence and communications in connection with the issue of said license to hold a race meeting at Windsor. Presented to the Legislature, April 6th, 1917. Mr. Wigle. <i>Not Printed.</i> |
| No. 83 | Report of the Horticultural Experiment Station, Vineland Station, Ontario, 1906-1915. Presented to the Legislature, April 6th, 1917. <i>Printed.</i> |
| No. 84 | Report of the Soldiers’ Aid Commission of Ontario, 1916. Presented to the Legislature, April 6th, 1917. <i>Not Printed.</i> |
| No. 85 | Return to an Order of the House of the 12th March, 1917, for a Return shewing what was the number of prisoners in all gaols, reformatories and prisons in the Province of Ontario, on the thirtieth day of September, 1916. Presented to the Legislature, April 6th, 1917. Mr. Parliament. <i>Not Printed.</i> |
| No. 86 | Return to an Order of the House of the 26th March, 1917, for a Return shewing:—1. What was the total number of members of the Inside Civil Service of the Government of the Province of Ontario and the total number in each department thereof on the 31st day of July, 1914, the 31st day of July, 1916, and the 28th day of February, 1917, respectively. Presented to the Legislature, April 6th, 1917. Mr. Elliott. <i>Not Printed.</i> |
| No. 87 | Return to an Order of the House of the 16th March, 1917, for a Return shewing:—1. What tenders were received for each and every of the lots advertised for sale by George W. Lee, Commissioner of the Temiskaming and Northern Ontario Railway in the “North Bay Times” on Thursday, October 12th, 1916. 2. Which of the said lots have been sold by the said George W. Lee, the Temiskaming and Northern Ontario Railway Commission or any officer or official thereof. 3. What were the prices and terms at and upon which each and every of the said lots were sold by the said George W. Lee, the said Commission or any officer or official thereof. 4. Which of the said lots sold by the said George W. Lee, the said Commission, or any officer or official thereof, within the municipalities of Porquis Junc- |

tion, Matheson, Cochrane, and Englehart, or what proportion of each and every lot so sold lies within the municipalities. Presented to the Legislature, April 6th, 1917. Mr. *Mageau*. *Not Printed*.

- No. 88 Return to an Order of the House of the 21st March, 1917, for a Return of copies:—1. Of all reports for the year ending October 31st, 1916, of the superintendents of each and all the asylums, government prisons and reformatories in Ontario. 2. Of letters between Assistant Provincial Secretary and Fred Hill, relating to the dismissal of the said Fred Hill from the staff of the Ontario Reformatory at Guelph. Presented to the Legislature, April 6th, 1917. Mr. *Grieve*. *Not Printed*.
- No. 89 Return to an Order of the House of the 16th February, 1917, for a Return shewing:—1. What amount has actually been paid since January 1st, 1916, for war purposes, by the Government, out of the proceeds of the Provincial War Tax. 2. For what particular purposes have such payments been made and what are the date of such payments. Presented to the Legislature, April 6th, 1917. Mr. *Bowman*. *Not Printed*.

REPORT

JOHN W. S. McCULLOUGH, M.D.,
Deputy Registrar-General,
Toronto, Ont.

DEAR SIR:

Please place the following address on your mailing list for
future issues of the Report of the Registrar-General of Ontario.

.....
.....
.....

IF IT IS DESIRED THAT FUTURE ISSUES OF THE
REPORT OF THE REGISTRAR-GENERAL OF ONTARIO BE
FORWARDED, SIGN THE ABOVE FORM AND MAIL TO THE
DEPARTMENT.

JOHN W. S. McCULLOUGH, M.D.,
Deputy Registrar-General,
Toronto, Ont.

DATE

REPORT

RELATING TO THE REGISTRATION OF

Births, Marriages and Deaths

IN THE

PROVINCE OF ONTARIO

FOR THE

Year Ending 31st December,

1916

(Being the 47th Annual Report)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO



TORONTO:

Printed and Published by A. T. WILGRESS, Printer to the King's Most Excellent Majesty

1917

Printed by
WILLIAM BRIGGS
Corner Queen and John Streets
TORONTO

To His Honour the Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I herewith beg to present for your consideration the Forty-Seventh Annual Report of the Registrar-General, relating to the Registration of Births, Marriages and Deaths in the Province of Ontario, during the year 1916.

Respectfully submitted,

WM. DAVID McPHERSON,

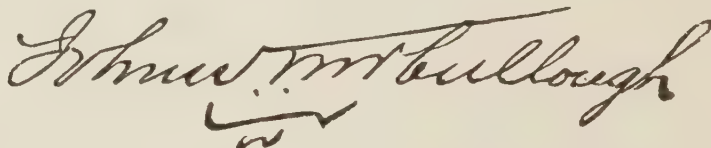
Registrar-General of Ontario.

SIR:—

I have the honour to submit for your approval the Forty-Seventh Annual Report made in conformity with and under the provisions of the Act respecting the Registration of Births, Marriages and Deaths in the Province of Ontario, for the year ending December 31st, 1916.

I have the honour to be, Sir,

Your obedient servant,

A handwritten signature in dark ink, reading "John W. McPherson". The signature is written in a cursive style with a large, sweeping initial "J" and a checkmark at the end.

Deputy Registrar-General.

TO HON. WM. DAVID MCPHERSON,

Registrar-General of Ontario.

REPORT UPON

Births, Marriages and Deaths

FOR THE YEAR 1916

The Forty-seventh Annual Report of Vital Statistics for the Province of Ontario is herewith presented.

POPULATION.

The estimated population of Ontario for the year 1916 is 2,776,885 divided as follows: Cities, 36.72 per cent.; towns, 5.76 per cent., and rural municipalities, 57.62 per cent. This is an estimated increase in the population for the year of 9,535 or .34 of one per cent. The increase in the population during the year 1914 was 2.62 per cent.; this fell to 0.63 per cent. in 1915 and again to .34 per cent. in 1916, and may be ascribed to the disturbed conditions of the country, owing to the great conflict in Europe.

BIRTHS.

The following table shows the number of birth registrations for 1916 and allows of a comparison between those of 1915 and 1916:—

	1916	Ratio	1915	Ratio
Entire Province	65,264	23.5	67,032	24.2
Cities	26,938	26.4	27,283	24.8
Towns.....	4,687	29.7	33,862	30.0
Rural municipalities	33,639	21.0	35,887	22.1

The natural increase, i.e., births over deaths, was 19,684.

The number of births decreased by 1,768 and the ratio per 1,000 of population by .7.

The relation of male births to female births was as follows:

	Male	Female	'M	to	F
Entire Province	33,663	31,601	or	106	to 100
Cities	13,928	13,010	"	107	" 100
Towns.....	2,438	2,249	"	108	" 100
Rural municipalities.....	17,297	16,642	"	103	" 100

ILLEGITIMATE BIRTHS.

The number of illegitimate births registered was 1,365, being 105 less than for 1915. This gives a rate of 20.9 per 1,000 births, which is 1.0 less than that of the previous year.

The rate may be shown as follows:

Entire Province.....	20.9	per 1,000	births
Cities	31.8	" 1,000	"
Towns	19.4	" 1,000	"
Rural Municipalities.....	7.8	" 1,000	"

There is a widespread idea that illegitimacy is much more prevalent during a war time than under normal conditions. Such does not seem to be the case in Ontario. It is admitted that from the data available in the belligerent countries that there is a *slight* increase, but that is not at all remarkable I quote from a brochure entitled "Illegitimacy in Europe as affected by the war," by Emma O. Lundberg, Federal Children's Bureau, Washington. This remark occurs: "Such figures as are available indicate that the actual number of both legitimate and illegitimate births have decreased since the war, but the decrease in the number of illegitimate births has been considerably less in proportion than the decrease in the number of legitimate births. Hence there has been a slight rise in the ratio of illegitimate to total births. The evidence obtainable does not bear out the reports that have been circulated of widespread increase of illegitimacy." The rate of illegitimacy to total births for the last five years has been as follows: 1912, 21.3; 1913, 26.6; 1914 (the year of the war) 22.1; 1915, 21.9; 1916, 20.9. Thus it will be seen that the rate in Ontario is actually lowered since war began.

MULTIPLE BIRTHS.

The number of pairs of twins registered in 1916 was 704, consisting of 726 boys and 682 girls. The cases of triplets were 11, consisting of 16 boys and 17 girls.

MARRIAGES.

The number of marriages registered in 1916 was 23,401, being at the ratio of 8.4 per 1,000 of the population, or 16.8 persons married per 1,000 of population. There were 105 fewer marriages; the rate, however, fell but 0.1.

There were married in cities 11,799 or 50.4 per cent.; in the towns, 1,827 or 7.8 per cent.; and in the rural municipalities, 9,775 or 41.8 per cent. The rates were as follows: cities, 11.5; towns, 11.5; rural municipalities, 6.1 per 1,000 of population.

MARRIAGES BY AGES.

Ages.	Total.	Bride- grooms.	Brides.	% who inter- married.	% who contracted mixed marriages.
15-19	5,274	540	4,734	15.39	84.61
20-24	18,178	8,396	9,782	51.82	48.18
25-29	12,500	7,499	5,001	37.92	62.08
30-34	5,189	3,335	1,854	24.78	75.22
35-39	2,490	1,602	888	22.00	78.00
40-44	1,317	812	505	19.89	80.11
45-49	735	445	290	19.86	80.14
50-54	444	297	147	21.62	78.38
55-59	291	198	93	14.43	85.57
60-64	195	129	66	19.48	80.52
65-69	114	86	28	19.30	80.70
70 and over	71	58	13	36.62	63.38
Not stated.....	4	4	.....	.....	.....
Mean age.....	26.4 years.	27.9 years.	24.7 years.		

MARRIAGES BY DENOMINATIONS.

Denomination.	Total.	Bride-grooms.	Brides.	% who inter-married.	% who contracted mixed marriages.
Anglican	9,627	4,768	4,859	61.53	38.47
Presbyterian	9,878	5,114	4,764	59.93	40.07
Methodist	12,128	6,056	6,072	65.74	34.26
Roman Catholic	7,937	3,907	4,030	86.75	13.25
Baptist	2,773	1,310	1,463	45.07	54.93
Congregationalist	354	189	165	38.70	61.30
Lutheran	1,179	587	592	70.79	29.21
Evangelical Association	198	101	97	60.60	39.40
Hebrew	841	422	419	97.26	2.74
Salvation Army	212	96	116	73.58	26.42
Others	1,626	821	805	73.92	26.08
Not given	49	30	19	73.47	26.53

CONJUGAL RELATIONS

	Number of Marriages between									Total Marriages
	Bachelors and			Widowers and			Divorced Men and			
	Spinsters	Widows	Divorced Women	Spinsters	Widows	Divorced Women	Spinsters	Widows	Divorced Women	
Province	21,697	350	13	720	592	5	17	4	3	23,401
Cities	10,881	210	12	365	305	5	14	4	3	11,799
Towns	1,712	27	.....	48	40	.....	.....	.....	.....	1,827
Rural	9,104	113	1	307	247	.....	3	.....	.....	9,775

Marriages by license, 20,411; by banns, 2,990.

DEATHS.

The following table shows the number of deaths registered during the year and allows of a comparison with the registrations of the preceding year:—

	1916	Ratio	1915	Ratio
Entire Province	35,580	12.8	33,294	12.0
Cities	14,287	14.0	13,080	12.8
Towns	2,609	16.5	2,053	15.9
Rural municipalities	18,684	11.7	18,161	11.2

It will be noted that the number of deaths has increased by 2,286 or 6.8 per cent. The ratio has increased by 0.8 per 1,000 of population.

The ten causes of death from organic diseases giving the highest mortality in the Province are shown together with the death rate per 100,000 of population:

		Ratio
Organic heart diseases	3,335	120
Pneumonia.....	2,962	104
Tuberculosis	2,559	92
Cancer.....	2,012	72
Apoplexy.....	1,485	53
Infantile diarrhoea.....	1,218	44
Diseases of the arteries.....	1,204	43
Bright's disease	1,017	37
Bronchopneumonia.....	887	31
Paralysis without specified cause.....	598	21

TUBERCULOSIS.

The rate of deaths from this disease in this year (1916) was 92 per 100,000 of population, being an increase of .03. The increase in the number was 93. The same ratio appeared in 1911, from which date there was a decrease till the lowest point was reached in 1913 and 1914 (85) ; there has been a slight increase in 1915 and 1916.

The following is an analysis of rates in city, town and rural municipalities:—

	Deaths	% of deaths from tuberculosis	Ratio per 100 M of population
Entire Province	2,559	100	92
Cities	934	35.5	91
Towns.....	174	6.8	110
Rural municipalities	1,451	56.7	93

DEATHS IN ONTARIO FROM TUBERCULOSIS BY AGES, 1907-1916.

Year.	Total.	Ratio per 100,000	Under 5 years.														80 & over.	Not stated.	Total deaths from all causes.
			0-1	1	2	3	4	5-9	10-14	15-19	20-29	30-39	40-49	50-59	60-69	70-79			
	23,794		594	368	225	140	136	467	578	1,881	6,776	4,904	3,058	2,204	1,526	680	129	308	324,486
1907	2,530	113	74	41	27	20	15	44	62	206	745	499	311	227	173	64	9	13	31,756
1908	2,511	110	68	46	20	13	13	43	67	216	764	479	315	217	136	70	14	30	30,947
1909	2,380	106	47	27	25	9	15	54	54	179	687	487	290	222	163	66	15	40	30,792
1910	2,291	102	38	35	19	15	6	36	55	184	652	463	293	222	160	71	18	24	31,332
1911	2,353	92	63	30	15	10	18	48	64	181	618	476	325	218	156	85	12	34	31,878
1912	2,250	87	53	30	19	9	15	46	42	154	631	500	304	200	134	64	7	42	32,150
1913	2,294	85	53	36	20	10	18	32	41	188	632	479	313	204	156	56	10	47	34,317
1914	2,340	85	54	41	20	16	11	56	58	181	688	469	307	214	116	63	12	34	32,440
1915	2,466	89	79	39	25	19	16	55	74	168	676	516	273	242	176	73	15	20	33,294
1916	2,559	92	66	43	35	19	9	53	61	224	683	536	327	238	156	68	17	24	35,580

TOTAL NUMBER OF DEATHS FROM TUBERCULOSIS IN EACH COUNTY IN
ONTARIO FOR TEN YEARS, 1907-1916.

	Totals	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916
Totals.....	23,974	2,530	2,511	2,380	2,291	2,353	2,250	2,294	2,340	2,466	2,559
Algoma	357	45	43	27	34	33	33	39	28	34	41
Brant	360	54	39	32	26	28	38	32	35	36	40
Bruce	486	66	68	43	64	47	36	48	34	42	48
Carleton.....	1,552	155	134	161	127	163	143	178	162	168	161
Dufferin.....	98	11	15	15	10	10	9	4	7	8	9
Elgin.....	287	20	33	28	18	26	26	28	41	33	34
Essex	589	66	67	63	62	60	61	54	60	52	44
Frontenac	589	72	47	43	58	63	56	58	52	68	72
Grey	446	61	43	55	58	32	43	52	31	41	30
Haldimand	148	10	13	14	13	18	15	13	21	18	13
Haliburton.....	41	7	4	4	4	3	5	2	3	3	6
Halton	139	12	14	13	17	17	16	6	15	17	12
Hastings	492	55	53	56	56	51	53	30	45	48	45
Huron.....	397	50	62	44	44	44	41	27	31	31	23
Kenora	84	.....	.....	13	6	16	7	15	12	7	8
Kent	530	59	48	53	52	51	51	52	48	53	63
Lambton	456	59	55	55	43	41	30	40	32	45	56
Lanark.....	342	39	49	46	37	30	27	30	33	21	30
Leeds and Grenville.....	763	96	66	86	77	82	96	69	59	73	59
Lennox and Addington.....	171	24	28	24	17	18	11	16	13	12	8
Lincoln.....	344	26	35	30	42	29	28	36	36	43	39
Manitoulin.....	60	.....	.....	2	2	3	7	4	4	28	10
Middlesex	989	103	118	88	85	99	95	96	102	95	108
Muskoka	419	33	39	41	34	44	47	43	32	46	60
Nipissing.....	303	38	39	25	24	35	42	20	15	33	32
Norfolk.....	186	13	23	31	15	17	14	20	12	25	16
Northumberland and Durham.....	499	64	63	48	49	45	44	51	33	51	51
Ontario.....	337	37	44	23	40	42	23	33	24	31	40
Oxford	380	55	50	37	38	43	36	32	30	21	38
Parry Sound.....	141	16	14	18	6	14	12	17	14	19	11
Peel.....	156	17	17	21	14	21	14	16	12	16	8
Perth	332	32	34	41	28	35	35	25	30	23	49
Peterboro'	396	44	41	47	39	37	36	51	36	32	33
Prescott and Russell	511	59	48	45	34	42	51	46	60	54	72
Prince Edward	149	13	18	17	14	11	13	16	11	20	16
Rainy River	88	20	18	4	4	6	7	4	10	8	7
Renfrew.....	365	37	28	35	24	31	33	42	43	46	46
Simcoe	749	73	82	82	82	67	65	70	72	78	78
Stormont, Dundas and Glengarry	759	100	102	81	66	83	58	59	72	61	77
Sudbury.....	180	.....	.....	22	18	10	18	20	29	32	31
Thunder Bay	422	38	26	32	44	38	35	47	58	56	48
Timiskaming	79	.....	.....	.....	.....	.....	.....	12	21	24	22
Victoria	226	51	14	23	23	18	13	16	27	17	24
Waterloo	438	48	48	43	41	42	46	40	42	45	43
Welland	343	29	34	36	31	31	34	43	35	32	38
Wellington.....	402	42	49	41	40	50	39	32	44	41	24
Wentworth	1,184	97	122	128	127	107	112	118	129	112	132
York.....	5,200	484	524	464	504	520	496	492	545	567	604

INFANT MORTALITY.

The number of deaths of infants under one year old has increased by 162, which makes the death rate 107 per 1,000 births. This is an increase of 5 over that of last year.

The following table gives an analysis of rates:—

	Births.	Deaths under 1.	Rate per 1,000 births.
Entire Province	65,264	7,000	107
Cities	26,938	3,286	121
Towns.....	4,687	609	129
Rural municipalities.....	33,639	3,105	92

A complete analysis of causes of deaths of infants under one, as well as for all deaths of infants under five years of age, will be found in Table 13.

Still births are in all cases excluded.

TABLE No. 1.

Showing the number of Births, Marriages and Deaths, and the ratio per 1,000 of population in each County (excluding Cities and Towns) 1916.

Counties.	Estimated Population.	Births, Excluding Still- Births.	Ratio per 1,000.	Marriages.	Ratio per 1,000.	Deaths, Excluding Still- Births.	Ratio per 1,000.
Total, including all municipalities.....	2,776,885	65,264	23.4	23,401	8.4	35,580	12.8
Total, excluding cities and towns.....	1,600,055	33,639	21.0	9,775	6.1	18,684	11.7
Algoma	33,480	491	14.6	176	5.2	224	6.6
Brant.....	24,450	497	20.3	137	5.6	256	10.6
Bruce.....	46,420	967	20.8	340	7.3	623	13.4
Carleton.....	41,210	728	17.7	170	4.1	433	10.5
Dufferin.....	16,290	322	19.7	113	6.9	184	11.2
Elgin.....	30,440	504	16.5	185	6.0	352	11.5
Essex	49,860	1,211	24.2	371	7.4	543	18.6
Frontenac.....	21,380	456	21.3	101	4.7	273	12.7
Grey	51,780	975	18.8	343	6.6	496	9.5
Haldimand.....	22,090	452	22.5	164	8.1	270	13.4
Haliburton	5,650	196	34.6	26	4.5	66	11.6
Halton.....	24,270	455	18.7	137	5.1	246	10.1
Hastings.....	40,680	928	20.7	276	6.1	494	11.0
Huron.....	50,340	911	20.0	375	7.4	631	12.5
Kenora	12,710	147	11.5	34	2.6	36	2.8
Kent.....	46,780	985	20.6	271	5.6	540	11.3
Lambton.....	40,700	791	19.4	270	6.6	500	12.2
Lanark	27,590	466	16.8	214	7.7	336	12.1
Leeds and Grenville	42,610	744	26.7	292	4.9	574	13.4
Lennox and Addington.....	19,840	356	17.9	130	6.5	217	10.9
Lincoln	26,910	492	18.4	163	6.1	291	10.9
Manitoulin.....	11,805	287	24.3	76	6.4	112	9.4
Middlesex.....	47,830	846	25.2	265	5.5	581	12.1
Muskoka.....	20,460	499	29.3	142	6.9	257	12.5
Nipissing.....	30,930	586	18.9	181	5.8	236	7.6
Norfolk	27,620	539	19.5	225	8.1	355	12.8
Northumberland and Durham.....	48,590	861	17.7	307	6.3	610	12.5
Ontario	31,620	678	19.5	243	7.0	404	11.6
Oxford.....	32,840	673	19.8	195	5.7	412	12.1
Parry Sound.....	27,125	624	22.9	116	4.2	267	9.8
Peel	23,130	464	19.9	134	5.7	238	10.2
Perth.....	34,870	688	19.7	244	6.9	368	10.6
Peterborough.....	22,180	473	21.3	120	5.4	231	10.4
Prescott and Russell.....	52,390	1,692	30.7	349	6.6	754	14.3
Prince Edward.....	17,240	324	18.7	111	6.4	271	11.7
Rainy River	10,605	311	29.3	74	6.9	85	9.0
Renfrew	45,790	1,039	22.6	302	6.5	485	10.5
Simcoe	57,770	1,125	21.3	306	5.8	787	14.9
Stormont, Dundas and Glengarry...	56,110	1,090	21.3	364	7.1	692	13.5
Sudbury	36,485	853	23.3	96	2.6	252	6.9
Thunder Bay.....	6,150	162	26.5	20	3.2	76	12.4
Timiskaming.....	26,995	1,104	41.2	198	7.4	471	17.6
Victoria.....	23,750	375	15.8	98	4.1	243	10.2
Waterloo.....	38,800	885	22.7	272	7.0	415	10.6
Welland.....	35,430	803	22.6	260	7.3	521	11.8
Wellington.....	38,020	732	19.2	241	6.3	523	13.7
Wentworth.....	38,480	697	18.1	150	3.9	463	12.0
York.....	78,560	2,155	27.4	398	5.0	1,090	13.8

TABLE No. 2.

Showing the total number of Births, Marriages and Deaths, and the ratio per 1,000 of population in each City in Ontario, 1916.

Cities.	Estimated Population.	Births. Excluding Still-Births.	Ratio per 1,000.	Marriages.	Ratio per 1,000.	Deaths. Excluding Still-Births.*	Ratio per 1,000.
Totals	1,019,210	26,938	26.4	11,799	11.5	14,287	14.0
Belleville	11,610	255	21.9	136	11.7	204	17.5
Brantford	26,350	709	26.5	289	10.9	377	14.3
Chatham	13,240	256	19.3	192	14.5	230	17.3
Fort William	18,850	815	47.5	202	10.7	288	15.2
Galt	11,880	279	23.4	116	9.7	143	12.0
Guelph	16,020	362	22.5	152	9.4	244	15.2
Hamilton	104,330	2,888	27.6	1,147	10.9	1,241	11.9
Kingston	22,270	591	26.5	264	11.8	500	22.4
Kitchener	19,200	569	29.6	184	9.5	227	11.8
London	55,240	1,284	23.2	631	11.4	932	16.8
Niagara Falls	12,030	275	22.8	294	24.4	145	12.0
Ottawa	96,720	2,448	25.3	1,057	10.9	1,742	18.0
Peterborough	18,950	448	23.6	215	11.3	324	17.0
Port Arthur	15,220	533	35.0	142	9.3	157	10.3
St. Catharines	16,690	554	33.4	250	15.0	286	17.2
St. Thomas	15,840	324	20.4	161	10.1	216	13.6
Sarnia	12,280	292	23.7	165	13.4	198	16.1
Sault Ste. Marie	12,920	271	20.9	133	10.2	196	15.1
Stratford	16,410	367	22.3	162	9.8	204	12.4
Toronto	470,000	12,498	26.5	5,158	10.9	5,931	12.6
Windsor	23,640	714	30.2	614	25.9	370	15.6
Woodstock	9,520	206	21.6	135	14.1	132	13.8

TABLE No. 3.

Showing the total number of Births, Marriages and Deaths in the Towns of 5,000 population in Ontario, together with the ratio per 1,000 of population, 1916.

Towns.	Estimated Population.	Births. Excluding Still-Births.	Ratio per 1,000.	Marriages.	Ratio per 1,000.	Deaths. Excluding Still-Births.	Ratio per 1,000.
Totals	157,620	4,687	29.7	1,827	11.5	2,609	16.5
Barrie	6,450	157	24.3	99	15.4	110	17.0
Brockville	9,510	241	25.3	119	12.5	165	17.3
Cobalt	5,880	209	35.5	70	11.9	69	11.7
Cobourg	4,710	91	19.3	61	12.9	100	21.2
Collingwood	6,540	154	23.5	87	13.3	103	15.7
Cornwall	7,200	228	31.6	111	15.4	164	22.7
Ingersoll	5,190	151	29.1	58	11.1	98	18.8
Kenora	6,470	145	22.4	50	7.7	62	9.5
Lindsay	7,030	162	23.0	103	14.6	105	14.9
Midland	6,880	196	28.5	43	6.2	82	11.9
North Bay	8,750	406	46.4	103	11.7	107	12.2
Orillia	7,850	192	24.4	90	11.4	102	13.0
Oshawa	8,830	258	29.2	86	9.7	126	14.2
Owen Sound	12,080	344	28.4	139	11.5	202	16.7
Parry Sound	6,120	185	30.2	74	12.0	128	20.9
Pembroke	7,300	198	17.1	75	10.2	144	19.7
Port Hope	4,650	87	18.2	61	14.4	80	18.9
Smith's Falls	6,340	176	17.7	48	7.5	127	20.0
Steelton	5,400	144	26.6	37	6.8	47	8.7
Sudbury	6,140	454	73.9	107	17.4	224	36.5
Trenton	5,000	128	25.6	62	12.3	75	15.0
Walkerville	5,100	119	23.3	50	9.8	44	8.0
Welland	8,200	262	31.9	94	11.4	145	17.6

TABLE No. 4.—Showing the number of BIRTHS registered and birth rate per 1,000 of census population in each County of the Province for each of the ten years, 1907-1916, inclusive.

Counties.	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	Totals.
Totals.....	53,584 24.1	57,155 25.6	54,465 24.3	55,871 24.9	57,235 22.6	*58,870 ⁰ 22.4	*64,516 ⁶ 24.0	*66,235 24.0	*67,032 24.2	*65,264 23.5	600,217 23.9
Algoma	1,370 29.6	1,211 28.3	757 16.3	784 16.8	795 18.8	849 19.1	894 17.4	813 15.8	985 18.1	906 17.4	9,364 19.7
Brant	938 24.1	1,000 25.0	931 23.8	1,048 26.5	1,100 23.9	1,160 24.7	1,202 24.3	1,305 26.1	1,165 23.4	1,206 23.7	11,053 24.5
Bruce	1,187 19.7	1,130 18.7	1,289 21.3	1,195 18.4	1,060 21.1	1,069 21.6	1,061 22.9	1,059 22.6	942 20.0	967 20.8	10,959 20.7
Carleton	2,567 26.0	2,606 26.3	2,515 25.3	2,568 25.8	2,659 22.8	2,993 25.1	3,127 24.8	3,232 24.8	3,258 23.4	3,176 23.0	28,701 24.7
Dufferin	340 15.8	400 18.6	368 17.0	387 17.4	352 19.8	321 18.3	367 22.3	302 18.7	340 20.9	322 19.7	3,498 18.8
Elgin	889 20.0	938 21.1	900 20.1	861 19.1	843 19.0	828 18.6	814 18.2	882 19.3	919 19.9	828 17.9	8,702 19.3
Essex	1,385 23.2	1,681 28.2	1,528 25.5	1,589 26.4	1,594 23.5	1,579 22.9	1,848 25.0	1,958 25.9	1,922 24.6	2,044 26.0	17,128 23.1
Frontenac	837 18.4	893 19.6	974 21.3	901 19.7	861 22.0	872 20.8	1,019 23.2	962 21.4	1,004 22.3	1,047 23.6	9,370 22.1
Grey.....	1,438 20.3	1,400 19.7	1,484 20.8	1,384 19.3	1,390 21.0	1,269 19.2	1,329 20.4	1,192 18.3	1,350 20.9	1,319 20.6	13,555 20.0
Haldimand	408 18.7	434 20.0	418 19.2	414 19.0	408 18.9	425 19.6	435 19.9	421 19.4	447 20.2	452 20.4	4,262 19.6
Halliburton	216 32.3	204 30.5	219 32.6	174 25.0	182 28.7	146 20.5	109 19.2	273 48.3	199 34.0	196 34.6	1,918 30.5
Halton	429 21.5	460 23.0	447 22.3	460 22.9	484 21.8	420 18.7	497 21.5	516 21.0	519 21.3	455 18.7	4,687 21.2
Hastings	1,393 23.1	1,289 21.3	1,245 20.5	1,192 19.6	1,229 22.0	1,310 23.5	1,320 23.9	1,358 24.2	1,250 22.9	1,311 22.9	12,897 22.3
Huron	1,166 18.5	1,091 17.3	1,059 16.7	983 15.5	1,085 20.4	974 18.5	984 19.3	956 19.0	940 18.5	911 18.1	10,149 18.1
Kenora.....	.....	.....	285	213	239 13.1	246 13.7	262 13.7	326 16.3	394 20.4	292 15.2	2,257 15.4
Kent	1,120 19.1	1,210 20.6	1,093 18.6	1,165 19.7	1,237 22.0	1,187 21.0	1,223 21.4	1,270 21.6	1,359 22.6	1,241 20.6	12,105 20.7
Lambton.....	1,073 18.5	1,107 19.1	942 16.2	943 16.2	942 18.3	957 18.9	945 17.9	972 16.4	1,081 20.0	1,083 20.4	10,045 18.1
Lanark.....	697 18.4	714 18.8	670 17.5	695 18.2	668 19.4	693 19.9	724 21.0	666 19.1	709 20.8	642 18.9	6,868 19.2
Leeds and Grenville	1,162 19.3	1,117 18.5	1,068 17.7	1,073 17.7	959 17.6	1,018 18.7	922 17.4	973 18.6	1,035 19.7	985 18.8	10,312 18.4
Lennox and Addington	404 17.0	401 16.8	382 16.0	361 15.0	367 18.0	391 17.8	356 17.8	342 17.3	353 17.6	356 16.9	3,713 17.0
Lincoln	652 20.9	704 22.6	687 21.9	715 22.8	735 20.7	806 22.4	920 23.2	1,014 24.5	1,057 24.5	1,046 23.9	8,336 22.7
Manitoulin .....	.....	.....	247	226	186 16.8	206 18.8	239 21.4	174 14.8	410 35.0	287 24.3	1,975 21.8
Middlesex	1,929 20.4	1,997 21.1	1,854 19.5	1,844 19.3	1,820 18.7	1,914 19.5	1,948 19.4	1,949 19.2	2,117 20.2	2,130 21.1	19,502 19.8
Muskoka	605 28.3	626 29.2	604 28.1	565 26.2	534 25.1	531 25.2	506 24.8	528 26.5	528 30.0	499 24.4	5,526 26.7
Nipissing	1,742 64.0	1,607 58.9	1,195 43.7	1,703 62.0	1,688 28.5	1,775 28.3	1,276 36.0	900 23.0	1,041 26.3	992 25.0	13,919 37.0
Norfolk	572 19.3	536 18.0	562 18.8	586 19.6	571 21.0	517 19.0	475 17.5	566 20.7	574 20.6	539 19.5	5,498 19.4
Northumberland and Durham..	1,164 18.4	1,164 18.3	1,134 17.8	1,216 19.1	1,142 19.2	1,142 19.2	1,075 18.1	1,132 19.2	1,134 19.4	1,039 17.9	11,342 18.6

*Still-births not included.

TABLE No. 4—Concluded.

Counties.	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	Totals.
Ontario	860 20.9	885 21.4	849 20.5	876 21.1	843 20.5	808 19.5	931 22.6	881 21.2	937 21.7	936 21.5	8,806 21.0
Oxford	986 20.0	994 20.1	997 20.1	973 19.6	926 19.5	974 20.4	1,008 21.4	972 20.2	1,006 20.9	1,030 21.6	9,866 20.3
Parry Sound	759 29.8	855 33.6	675 26.4	691 27.0	790 29.7	675 26.0	632 23.4	781 28.5	849 31.6	809 24.3	7,516 28.0
Peel	381 17.4	446 20.3	427 19.4	426 19.3	414 18.7	418 18.8	446 20.4	438 20.0	479 20.6	464 20.0	4,339 19.4
Perth	1,029 20.2	1,004 19.7	1,029 20.1	972 19.0	947 19.2	963 19.6	950 18.8	1,036 20.4	1,088 21.0	1,055 20.5	10,073 19.8
Peterborough	870 23.7	986 26.8	866 23.4	930 25.1	925 22.2	977 23.0	969 22.8	982 22.8	941 22.3	921 22.3	9,367 23.4
Prescott and Russell	1,733 36.0	1,881 38.9	1,760 36.3	1,842 37.0	1,767 34.1	1,659 31.6	1,860 36.7	1,715 32.4	1,770 33.1	1,692 32.3	17,679 33.4
Prince Edward	321 17.6	328 17.9	326 17.8	319 17.4	332 19.3	290 16.8	342 20.4	294 17.4	328 19.4	324 18.7	3,204 18.2
Rainy River	441 26.3	457 27.2	240 14.2	234 13.8	215 21.3	254 28.1	334 31.9	319 29.0	334 31.8	311 29.3	3,139 25.3
Renfrew	1,391 25.9	1,471 27.3	1,291 23.9	1,227 22.7	1,223 23.5	1,179 22.9	1,223 23.3	1,188 22.1	1,267 23.6	1,237 23.3	12,697 23.8
Simcoe	2,032 24.6	2,115 25.2	1,981 23.5	1,851 21.9	1,873 22.0	1,804 21.0	1,964 22.8	1,929 22.4	1,933 22.4	1,824 21.3	19,306 22.7
Stormont, Dundas & Glengarry	1,465 20.9	1,497 21.2	1,460 20.7	1,237 17.5	1,330 20.7	1,135 17.7	1,259 20.0	1,249 19.5	1,266 20.0	1,318 20.8	13,216 19.9
Sudbury .....	.....	.....	836	665	818 23.4	779 19.7	873 21.4	1,025 24.0	1,403 33.5	1,307 30.6	7,706 25.4
Thunder Bay	784 61.4	962 75.2	871 67.6	1,083 84.1	1,241 31.7	1,353 33.0	1,657 38.2	1,836 40.3	1,862 41.5	1,510 37.5	13,159 51.0
Timiskaming .....	.....	.....	.....	.....	.....	.....	876 30.3	1,294 44.5	1,369 45.5	1,313 39.9	4,852 40.0
Victoria	686 21.1	774 23.7	661 20.2	691 21.0	584 19.3	648 20.9	607 20.1	551 17.9	612 20.3	537 17.4	6,351 20.1
Waterloo	1,325 24.7	1,612 30.0	1,347 25.0	1,430 26.5	1,429 22.8	1,515 23.3	1,643 24.0	1,819 26.2	1,774 25.6	1,733 24.8	15,627 25.2
Welland	738 22.8	857 26.6	780 24.1	917 28.3	942 22.3	1,044 24.1	1,149 23.6	1,326 24.8	1,289 24.0	1,340 24.0	10,382 24.4
Wellington	1,099 19.4	1,134 19.9	1,111 19.5	1,108 19.4	1,100 20.1	1,085 19.9	1,105 20.3	1,072 19.5	1,067 19.4	1,094 20.2	10,975 19.7
Wentworth	2,280 28.2	2,556 31.5	2,336 28.7	2,622 32.1	2,663 23.8	3,149 26.9	3,372 25.2	3,602 26.4	3,401 25.1	3,585 25.1	29,566 27.2
York	8,721 31.4	10,421 37.4	9,765 35.0	10,532 37.6	11,743 26.4	12,573 26.1	15,439 29.8	15,877 28.7	15,025 27.2	14,653 26.7	124,749 30.6

TABLE No. 5.—Showing the number of MARRIAGES registered and marriage rate per 1,000 of census population in each County of the Province for each of the ten years, 1907=1916, inclusive.

Counties.	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	Totals.
Totals.....	21,915 9.8	21,058 9.0	22,366 10.0	24,036 10.7	25,807 10.2	28,845 11.1	26,998 10.0	24,245 8.8	23,506 8.5	23,401 8.4	242,177 9.6
Algoma	482 10.4	475 10.2	382 9.2	302 6.4	340 8.0	403 9.0	342 6.6	352 6.8	331 6.4	346 6.6	3,755 7.9
Brant	359 9.2	329 8.4	325 8.3	385 9.0	414 9.0	467 9.9	485 9.8	443 8.8	405 8.1	426 8.3	4,038 3.8
Bruce	369 6.1	299 4.9	355 5.8	352 5.8	311 6.2	344 6.9	372 8.0	311 6.6	333 7.0	340 7.3	3,386 6.4
Carleton	959 9.7	925 9.3	941 9.4	1,047 10.5	1,123 9.6	1,221 10.2	1,194 9.5	1,224 9.3	1,175 8.4	1,227 8.9	11,036 9.4
Dufferin	134 5.1	140 6.5	119 5.5	134 5.2	142 8.0	130 7.4	113 6.8	112 6.9	103 6.3	113 6.9	1,240 6.4
Elgin.....	341 7.6	396 8.9	352 7.8	334 7.4	342 7.7	368 8.2	387 8.7	357 7.7	346 7.5	346 7.4	3,569 7.8
Essex	2,168 36.2	2,120 35.8	2,508 41.9	2,836 47.8	3,426 50.7	4,149 60.2	2,082 28.1	1,050 13.9	996 12.8	1,035 13.1	22,370 34.0
Frontenac	356 7.8	326 7.3	366 8.0	364 7.9	381 8.9	427 10.2	382 8.7	366 8.1	406 9.1	365 8.3	3,739 8.4
Grey	492 6.8	412 5.8	432 6.0	468 6.5	460 7.1	496 7.5	506 7.7	441 6.7	415 6.4	482 7.5	4,604 6.8
Haldimand	151 6.9	174 8.0	136 6.2	149 6.8	130 6.0	146 6.7	153 7.0	150 6.9	160 7.2	164 7.4	1,513 70.1
Haliburton	32 4.7	37 5.5	26 3.8	30 4.4	31 4.9	22 3.9	35 6.1	25 4.4	39 6.6	26 4.5	303 4.8
Halton	134 6.7	118 5.9	134 6.7	130 6.4	132 5.9	160 7.1	180 7.7	166 6.7	141 5.8	137 5.6	1,432 6.4
Hastings	493 8.1	486 8.0	469 7.7	430 7.0	439 7.8	470 8.4	664 12.0	452 8.0	420 7.7	474 8.3	4,797 8.3
Huron	423 6.7	376 5.9	358 5.6	398 6.2	364 6.8	348 6.6	372 7.3	323 6.4	356 7.0	375 7.4	3,693 5.9
Kenora .....	.....	.....	72	69	72	54	188	71	75	84	685
	.....	.....	.....	.....	3.9	3.0	9.9	3.5	3.9	4.3	6.7
Kent	402 6.9	425 7.2	408 6.9	454 7.7	459 8.1	475 8.4	502 8.8	451 7.6	458 7.6	463 7.7	4,497 7.6
Lambton	509 8.8	483 8.3	466 8.0	486 8.3	523 10.1	518 10.2	450 8.5	445 8.3	406 7.6	435 8.2	4,721 8.6
Lanark	249 6.5	223 5.8	219 5.8	274 7.0	264 7.6	245 7.1	279 8.1	239 6.9	242 7.1	262 7.7	2,496 6.0
Leeds and Grenville	437 7.3	433 7.1	437 7.2	452 7.4	426 7.8	498 9.1	449 8.4	353 6.7	416 7.9	411 7.8	4,312 7.6
Lennox and Addington.....	156 6.5	173 7.2	169 7.0	143 5.0	169 8.2	154 7.0	183 9.1	139 7.0	148 7.4	130 6.5	1,564 7.0
Lincoln	236 7.5	231 7.4	290 9.2	294 9.3	332 9.3	348 9.7	355 8.9	393 9.5	481 11.1	413 9.4	3,373 9.1
Manitoulin .....	.....	.....	67	69	57	56	65	45	78	76	513
	.....	.....	.....	.....	5.1	5.2	5.8	3.8	6.6	6.4	6.6
Middlesex	863 9.1	781 8.2	745 7.8	813 8.5	834 8.5	928 9.4	900 8.9	900 8.8	950 9.1	896 8.6	8,610 8.6
Muskoka	167 7.8	150 7.0	133 6.2	134 6.4	132 6.2	160 7.5	148 7.2	142 7.2	142 8.0	142 6.9	1,450 7.0
Nipissing	455 16.7	373 13.8	344 12.5	423 15.4	428 7.2	473 7.5	254 6.8	273 7.0	257 6.5	284 7.1	3,569 10.0
Norfolk	232 7.7	208 6.9	193 6.4	226 7.5	183 6.7	193 7.1	211 7.8	228 8.3	197 7.1	225 8.1	2,096 7.3
Northumberlandand Durham....	449 7.1	395 6.2	401 6.3	415 6.5	404 6.8	390 6.5	431 7.2	379 6.4	364 6.2	429 7.4	4,057 6.6

TABLE No. 5—Concluded.

Counties.	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	Totals.
Ontario	250 6.0	261 6.3	263 6.3	264 6.3	269 6.5	277 6.7	292 7.0	308 7.4	267 6.2	329 7.6	2,780 6.6
Oxford	381 7.7	332 6.7	372 7.5	336 6.7	352 7.4	382 8.0	358 7.6	400 8.3	359 7.4	388 8.2	3,660 7.5
Parry Sound	225 8.0	193 7.5	174 6.8	160 6.2	194 7.3	167 6.4	179 6.6	186 6.7	173 6.4	190 5.7	1,841 6.7
Peel	129 5.8	153 6.9	163 7.4	136 6.1	133 6.0	142 6.0	134 6.1	137 6.2	138 5.9	134 5.8	1,399 6.1
Perth	394 7.7	349 6.8	349 6.8	337 6.5	369 7.5	403 8.2	372 7.3	368 7.2	422 8.1	406 7.9	3,769 7.4
Peterborough	303 8.2	294 7.9	334 9.5	315 8.5	346 8.2	377 8.8	353 8.3	354 8.2	310 7.3	335 8.1	3,321 8.3
Prescott and Russell	402 8.3	333 6.9	349 7.2	348 7.1	350 6.7	336 6.4	342 6.7	330 6.2	312 5.8	349 6.6	3,451 6.8
Prince Edward	147 8.0	139 7.6	123 6.7	122 6.6	116 6.7	116 6.7	120 7.1	117 6.9	131 7.7	111 6.4	1,242 7.0
Rainy River	161 9.6	196 11.6	81 4.8	91 5.4	74 7.3	96 9.3	104 9.9	125 11.3	77 7.3	74 6.9	1,079 8.3
Renfrew	384 7.1	370 6.8	371 6.8	369 6.8	318 6.1	360 7.0	385 7.3	408 7.6	350 6.5	377 7.0	3,692 6.9
Simcoe	671 8.0	574 6.8	580 6.8	630 7.4	635 7.4	647 7.5	498 5.7	599 6.9	556 6.4	625 7.3	6,015 7.0
Stormont, Dundas and Glengarry	487 6.9	436 6.2	467 6.6	388 5.4	331 5.1	366 5.7	399 6.3	430 6.7	418 6.6	475 7.5	4,197 6.3
Sudbury .....	..... .....	..... .....	181	163	122 3.4	183 4.6	256 6.2	227 5.3	211 5.0	203 4.7	1,546 6.8
Thunder Bay	276 21.6	305 23.8	354 27.5	386 30.0	418 10.6	461 11.2	595 13.7	493 10.8	365 8.8	364 9.0	4,017 16.7
Timiskaming .....	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	281 9.7	288 9.9	273 9.1	268 8.1	1,110 9.2
Victoria	211 6.4	183 5.6	240 7.3	217 6.6	199 6.5	213 6.8	20 7.2	234 7.6	209 6.9	201 6.5	2,127 6.7
Waterloo	482 8.9	463 8.6	437 8.1	482 8.9	486 7.7	576 8.8	623 9.1	632 9.1	603 8.7	572 8.1	5,356 8.6
Welland	404 12.5	767 23.7	1,091 33.7	1,375 42.4	1,524 36.1	1,840 42.5	1,108 22.8	743 13.9	672 12.5	648 11.6	10,172 25.1
Wellington	416 7.3	431 7.5	378 6.6	426 7.4	378 6.9	378 6.9	412 7.7	358 6.5	429 7.8	393 7.2	3,999 7.1
Wentworth.....	951 11.7	887 10.9	919 11.3	1,075 13.1	1,271 11.3	1,464 12.5	1,548 11.6	1,320 9.6	1,307 9.6	1,297 9.1	12,039 11.0
York	4,193 15.1	3,899 14.0	4,293 15.3	4,805 17.1	5,604 12.6	6,418 13.3	6,737 13.0	6,358 11.5	6,084 10.9	5,556 10.1	53,947 13.

TABLE No. 6.—Showing the number of DEATHS registered and Death rate per 1,000 of census population in each County of the Province for each of the ten years, 1907-1916, inclusive. }

Counties.	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	Totals.
Totals	33,502 15.0	32,714 14.6	32,628 14.6	33,539 14.9	34,341 13.6	*32,150 12.4	*34,317 12.7	*32,440 11.8	33,294 11.2	35,580 12.8	334,505 13.3
Algoma	566 12.2	596 12.8	413 8.8	490 10.5	461 10.9	470 10.6	515 10.0	400 7.7	472 9.1	467 9.0	4,850 10.1
Brant	588 15.4	546 14.0	536 13.8	551 14.0	565 12.3	567 12.1	568 11.4	510 10.2	527 10.6	633 12.5	5,591 12.6
Bruce	776 12.9	718 11.9	706 11.6	650 10.7	648 12.9	621 12.5	603 13.0	540 11.5	573 12.2	623 13.4	6,458 12.2
Carleton	1,811 18.3	1,830 18.5	1,773 17.8	1,917 19.2	2,147 18.4	1,933 16.3	2,142 17.0	2,084 16.0	2,100 15.0	2,175 15.7	19,912 17.7
Dufferin	256 11.9	218 10.1	207 9.6	219 10.1	185 10.4	166 6.6	190 11.5	158 9.8	200 12.3	184 11.2	1,983 10.3
Elgin	550 12.4	562 12.6	527 11.8	488 10.9	505 11.3	539 12.1	526 11.8	561 12.3	525 11.3	568 12.2	5,351 13.1
Essex	774 13.0	849 14.2	830 13.8	800 13.3	881 13.0	808 11.7	919 12.4	867 11.5	830 10.7	957 12.1	8,515 14.0
Frontenac	706 15.5	611 13.4	605 13.2	697 15.2	672 15.7	705 16.8	740 16.9	657 14.6	694 15.4	773 17.7	6,860 16.9
Grey	837 11.8	770 10.8	795 11.1	711 9.9	743 11.2	738 11.2	767 11.7	679 10.4	691 10.7	698 10.9	7,429 12.1
Haldimand	240 11.1	211 9.7	226 10.4	228 10.4	276 12.8	229 10.6	265 12.1	255 11.7	278 12.5	270 13.4	2,478 12.7
Haliburton	84 12.5	78 11.6	80 12.0	68 10.1	74 11.7	62 10.9	40 7.0	81 14.3	72 12.3	66 11.7	705 12.5
Halton	263 13.2	258 12.9	249 12.4	254 12.6	258 11.6	229 10.2	234 10.1	223 9.0	264 10.8	246 10.1	2,478 11.2
Hastings	851 14.1	771 12.7	731 12.0	780 12.8	806 14.4	709 12.7	725 13.1	754 13.4	733 13.4	773 13.5	7,633 14.4
Huron	726 11.5	705 11.1	720 11.3	627 9.8	673 12.7	600 11.2	643 12.6	589 11.7	608 12.0	631 12.5	6,522 12.8
Kenora .....	.....	.....	136	114	116 6.4	146 8.4	128 6.7	143 7.1	103 5.3	98 5.1	984 6.5
Kent	801 14.5	735 12.5	705 12.0	733 12.4	787 14.0	608 10.4	674 11.8	700 11.9	727 20.0	770 12.8	7,240 14.5
Lambton	770 13.3	702 12.1	647 11.1	588 10.1	639 12.4	611 12.0	607 11.5	560 10.5	581 10.8	698 13.1	6,403 13.0
Lanark	480 12.8	484 12.7	435 11.4	479 12.2	434 12.6	428 12.4	402 11.6	461 13.4	410 12.0	463 13.6	4,476 13.7
Leeds and Grenville	877 14.6	742 12.3	785 12.1	798 13.1	764 14.0	896 16.5	759 14.3	720 13.8	784 13.9	739 14.1	7,864 15.9
Lennox and Addington	308 12.1	267 11.2	263 11.0	316 13.2	264 12.9	229 10.4	256 12.8	208 10.4	254 12.7	217 10.9	2,582 13.0
Lincoln	450 14.4	424 13.6	505 16.0	482 15.3	459 12.9	460 12.8	544 13.7	536 12.9	532 12.3	577 13.2	4,969 15.2
Manitoulin .....	.....	.....	90	67	72 6.5	69 6.3	72 6.4	73 6.2	162 13.8	112 9.5	717 8.1
Middlesex	1,365 14.4	*1,323 13.9	1,260 13.2	1,348 14.1	1,313 13.5	1,191 12.1	1,401 14.0	1,267 12.5	1,396 13.3	1,513 14.6	13,377 14.9
Muskoka	238 11.1	275 12.8	279 13.0	257 11.9	243 11.4	209 9.9	210 10.2	188 9.4	232 13.1	257 12.5	2,388 12.9
Nipissing	845 31.0	772 28.3	758 27.7	812 29.5	730 12.3	618 9.8	444 11.9	296 7.5	349 8.8	343 8.6	5,967 20.3
Norfolk	348 11.7	385 12.9	363 12.1	368 12.3	343 12.6	330 12.1	373 13.7	322 11.8	327 11.7	355 12.8	3,514 13.6
Northumberland and Durham....	869 13.7	827 13.0	765 12.0	861 13.5	757 12.7	739 12.4	727 12.2	704 12.0	776 13.2	790 13.6	7,815 14.1

* Still-births excluded.

TABLE No. 6—Concluded.

Counties.	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	Totals.
Ontario	507 12.3	556 13.5	571 13.8	617 14.8	559 13.6	494 11.9	536 13.0	495 11.9	510 11.7	530 12.2	5,375 12.8
Oxford	714 14.5	582 10.7	566 11.4	565 11.3	629 13.2	582 12.2	583 12.4	532 11.0	572 11.9	642 13.5	5,967 12.2
Parry Sound	355 14.0	305 11.9	268 10.5	252 9.8	316 11.9	272 10.4	259 9.5	272 9.9	274 10.2	395 11.8	2,968 11.0
Peel	270 12.3	253 11.5	271 12.3	278 12.6	271 12.2	230 10.3	244 11.1	243 11.1	257 11.0	238 10.2	2,555 11.4
Perth.....	569 11.2	573 11.2	558 10.9	524 10.2	514 10.4	520 10.6	532 10.5	522 10.3	515 9.9	572 11.1	5,399 10.6
Peterborough	507 13.8	517 14.0	539 14.6	569 15.3	606 14.5	470 11.0	521 12.2	459 10.6	475 11.2	555 13.4	5,218 13.0
Prescott and Russell	811 16.8	739 15.3	764 15.7	692 14.2	771 14.8	613 11.6	697 13.7	699 13.3	741 13.8	754 14.3	7,281 14.4
Prince Edward	268 14.7	281 15.4	262 14.3	278 15.1	244 14.2	236 13.7	231 13.7	225 13.3	243 14.4	271 15.7	2,539 14.4
Rainy River	383 22.8	422 25.1	83 4.9	96 5.6	111 11.0	79 7.6	122 11.6	115 10.4	93 8.8	85 8.0	1,589 11.5
Renfrew	644 12.0	585 10.8	591 10.9	565 10.4	629 12.1	603 11.7	574 10.9	568 10.5	607 11.2	629 11.3	5,995 11.2
Simcoe	1,113 13.3	1,089 12.9	1,159 13.7	1,083 12.8	1,156 13.5	1,042 12.1	1,048 12.2	1,069 12.4	1,086 13.7	1,184 13.8	11,029 13.0
Stormont, Dundas and Glengarry	950 13.5	893 12.7	863 12.2	803 11.3	908 14.1	804 12.5	757 12.0	781 12.2	802 12.7	856 13.5	8,417 12.6
Sudbury.....	..... .....	..... .....	359	405	362 10.3	423 10.7	456 11.2	453 10.6	409 9.7	476 11.1	3,343 10.1
Thunder Bay.....	485 37.9	557 43.5	480 34.7	600 46.6	523 13.3	494 12.0	725 16.7	676 14.8	523 12.6	521 12.9	8,584 24.5
Timiskaming .....	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	297 10.2	373 12.8	429 14.2	540 16.4	1,639 13.4
Victoria	449 13.8	406 12.4	352 10.7	377 11.5	370 12.2	338 10.8	338 11.1	303 9.8	309 10.2	348 11.3	3,590 11.3
Waterloo	681 12.7	664 12.1	693 12.8	793 14.7	736 11.7	661 10.1	778 10.4	727 10.4	746 10.7	785 11.1	7,264 11.6
Welland	521 16.2	518 16.0	470 14.5	575 17.7	522 12.3	499 11.0	677 13.9	610 11.4	621 10.5	711 12.8	5,724 13.6
Wellington.....	684 12.0	674 11.8	721 12.6	668 11.7	720 13.2	681 12.5	731 13.4	652 11.8	696 12.7	767 14.2	6,994 12.5
Wentworth.....	1,419 17.5	1,511 18.5	1,467 18.0	1,579 19.3	1,606 14.3	1,654 14.1	1,603 12.0	1,593 11.6	1,622 11.9	1,704 11.9	15,758 14.9
York	5,793 20.8	5,930 21.3	6,202 22.2	6,517 23.3	6,973 15.6	6,545 13.6	7,134 13.7	6,537 11.3	6,564 11.9	7,021 14.1	65,216 16.8

TABLE No. 7.
Recapitulation of Causes of Death by Classes of Diseases in Counties, 1916.

Causes of Death by Classes of Diseases.	Ages.												Sex.		Months.																
													Male.	Female.	Not stated.																
	Under 0-1.	1.	2.	3.	4.	5-9.	10-14.	15-19.	20-29.	30-39.	40-49.	50-59.				60-69.	70-79.	80 and over.	Not stated.												
Total.	7,000	1,245	542	328	237	795	507	787	2,104	2,301	2,345	3,015	4,250	5,403	4,377	344	18,869	16,711	:	3,778	3,313	3,396	3,237	2,965	2,588	2,800	2,746	2,783	2,723	2,375	2,876
Grand Total, including all municipalities	18,684	3,105	547	156	112	389	276	409	995	1007	1104	1446	2291	3336	2979	280	9,907	8,777	...	1940	1860	1805	1628	1552	1372	1533	1353	1383	1482	1269	1497
Total, excluding cities and towns	4,385	231	147	79	34	170	119	192	520	448	433	494	587	541	280	62	2,166	2,219	...	461	454	436	421	384	308	319	284	302	375	288	353
I. General diseases	2,140	264	66	31	22	48	22	33	55	70	127	199	366	513	273	30	1,059	1,081	...	205	196	207	192	171	167	170	140	164	182	168	178
II. Diseases of the nervous system and of the organs of special sense	2,639	2	2	5	1	13	18	21	48	76	142	318	589	875	494	32	1,435	1,204	...	263	284	252	198	213	216	214	194	189	215	191	210
III. Diseases of the circulatory system	2,389	457	178	68	31	23	30	43	92	107	133	133	271	457	304	30	1,251	1,138	...	397	309	318	264	189	140	97	69	82	137	160	227
IV. Diseases of the respiratory system	1,240	416	91	31	23	12	25	34	39	45	64	79	140	128	52	13	661	579	...	81	76	90	60	89	66	103	203	223	113	64	72
V. Diseases of the digestive system	772	24	3	4	2	6	4	9	25	36	64	94	157	192	137	12	469	303	...	63	68	72	64	64	60	75	49	42	70	70	75
VI. Non-venereal diseases of the genito-urinary system and adnexa	140	.....	.....	.....	.....	.....	.....	7	49	64	18	.....	.....	.....	.....	2	.....	140	...	11	12	12	19	18	11	12	10	9	7	10	9
VII. The puerperal state	140	6	.....	.....	.....	.....	1	1	7	6	1	14	18	42	40	1	78	62	...	13	15	15	12	14	16	10	9	11	11	9	5
VIII. Diseases of the skin and cellular tissue	9	1	.....	.....	.....	.....	1	1	1	1	1	.....	1	.....	1	...	6	3	...	.....	1	.....	3	1	2	1	1	.....	.....	.....	.....
IX. Diseases of the bones and of the organs of locomotion.	99	99	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	44	55	...	11	11	11	5	9	5	5	11	5	8	10	10
X. Malformations	1,578	1,578	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	902	676	...	135	141	147	141	149	140	123	147	130	107	107	111
XI. Diseases of early infancy..	1,932	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	958	974	...	206	225	179	171	158	147	116	131	149	149	124	177
XII. Old age	1,033	23	28	23	12	62	46	61	146	138	100	96	68	75	55	78	780	253	...	74	48	50	65	78	77	267	95	71	92	60	56
XIII. Affections produced by external causes	188	2	31	10	4	7	10	10	13	16	21	19	18	9	3	8	98	90	...	20	20	16	23	15	17	21	21	6	16	10	14
XIV. Ill-defined diseases	1,134	1,134	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	651	483	...	100	93	124	121	84	98	99	77	77	91	93	77
Still-Births (not incl. in totals).	1,134	1,134	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	651	483	...	100	93	124	121	84	98	99	77	77	91	93	77

TABLE No. 8.
Recapitulation of Causes of Death by Classes of Diseases in Cities, 1916.

Causes of Death by Classes of Diseases.	Ages.															Sex.		Months.														
	Under 0-1.	1.	2.	3.	4.	5-9.	10-14.	15-19.	20-29.	30-39.	40-49.	50-59.	60-69.	70-79.	80 and over.	Not stated.	Male.	Female.	Not stated.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
Grand Total	14,287	3,286	574	247	144	110	342	198	301	896	1,129	1,061	1,351	1,682	1,749	1,178	39	7,526	6,761	:	1,578	1,256	1,321	1,363	1,176	1,001	1,075	1,154	1,188	1,047	939	1,189
I. General diseases	3,464	305	157	100	73	53	165	72	130	351	362	365	450	426	304	112	9	1,715	1,749	..	416	347	316	321	275	229	274	223	283	253	238	279
II. Diseases of the nervous system and of the organs of special sense.	1,497	244	58	23	8	13	34	22	23	73	83	104	165	229	241	150	7	798	69	..	167	139	155	131	127	108	131	98	106	123	106	106
III. Diseases of the circulatory system	1,791	8	4	1	5	6	21	19	16	83	121	156	249	409	453	232	8	896	895	..	201	138	169	182	159	147	119	116	144	124	124	168
IV. Diseases of the respiratory system	2,157	493	197	58	27	15	43	19	39	113	130	112	178	257	262	181	3	1,159	998	..	369	261	247	277	218	115	82	75	78	104	122	209
V. Diseases of the digestive system	1,464	660	116	30	13	4	36	28	24	65	99	97	98	89	68	35	2	762	702	..	81	62	96	87	78	79	136	302	257	119	79	88
VI. Non-venereal diseases of the genito-urinary system and adnexa	721	31	7	1	3	1	5	2	11	44	83	73	106	149	140	62	5	396	325	..	70	50	62	63	61	61	56	53	63	52	72	58
VII. The puerperal state	154	.....	.....	.....	.....	.....	.....	.....	7	64	72	11	.....	.....	.....	.....	.....	.....	154	..	9	18	22	16	18	19	11	11	9	5	5	11
VIII. Diseases of the skin and cellular tissue	87	10	2	2	.....	1	1	.....	.....	1	4	6	7	10	23	20	..	48	39	..	8	10	8	11	7	11	8	1	6	7	6	4
IX. Diseases of the bones and of the organs of locomotion.	12	3	.....	.....	.....	1	.....	.....	.....	1	4	.....	.....	1	1	1	..	9	3	..	1	2	1	1	.....	2	.....	1	1	1	1	1
X. Malformations	121	121	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	..	68	53	..	12	6	12	12	10	13	7	9	5	13	6	16
XI. Diseases of early infancy..	1,388	1,388	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	..	801	587	..	114	106	124	148	103	100	113	133	123	138	86	100
XII. Old age	573	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	36	195	342	..	243	330	..	70	53	53	53	47	49	38	35	36	40	41	58
XIII. Affections produced by external causes	723	18	12	27	13	16	30	33	41	94	127	86	75	55	53	37	6	551	172	..	45	54	45	55	58	58	90	77	61	58	47	75
XIV. Ill-defined diseases	135	5	21	5	2	.....	7	3	.....	7	14	21	23	11	9	6	1	80	55	..	15	10	11	6	15	10	10	10	16	10	6	16
Still-Births (not included in totals)	1,332	1,332	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	..	735	571	..	110	110	129	82	124	111	117	120	99	121	95	114

TABLE No. 9.
Recapitulation of Causes of Death by Classes of Diseases in Towns of 5,000 population, 1916.

Causes of Death by Classes of Diseases	Ages.															Sex.		Months.														
																Male.	Female.	Not stated.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
	Under 0-1.	1.	2.	3.	4.	5-9.	10-14.	15-19.	20-29.	30-39.	40-49.	50-59.	60-69.	70-79.	80 and over.																Not stated.	
Grand Total	2,609	609	124	44	28	14	64	33	77	213	165	180	218	277	318	220	25	1,436	1,173	260	197	270	236	237	215	192	239	212	194	167	190
I. General diseases.....	55	37	20	7	7	24	10	36	85	75	67	77	77	87	51	16	7	354	307	..	74	56	84	66	66	39	53	39	44	41	40	
II. Diseases of the nervous system and of the organs of special sense	51	19	5	4	1	2	5	5	11	4	13	21	42	51	27	3	138	123	..	28	15	31	23	32	20	14	15	22	20	18	23	
III. Diseases of the circulatory system .....	.....	1	1	.....	.....	3	6	2	22	12	27	43	54	77	27	3	154	134	..	23	25	22	25	26	31	19	24	19	25	23	26
IV. Diseases of the respiratory system	88	41	9	7	2	10	3	7	18	22	25	35	35	35	27	2	205	149	..	54	30	48	41	40	28	15	15	13	19	21	30	
V. Diseases of the digestive system	110	20	6	4	1	14	4	7	15	11	13	18	18	14	7	2	129	135	..	19	17	17	15	11	17	25	62	45	17	11	8	
VI. Non-venereal diseases of the genito-urinary system and adnexa	3	1	.....	.....	.....	1	1	2	4	8	8	23	21	21	9	1	55	48	..	8	8	13	5	3	13	5	6	11	11	7	13
VII. The puerperal state.....	34	.....	.....	.....	.....	.....	.....	9	18	7	.....	.....	.....	.....	.....	.....	.....	.....	34	..	2	2	3	5	3	2	3	1	4	2	1
VIII. Diseases of the skin and cellular tissue.....	20	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	10	10	..	1	3	1	3	1	3	3	2	1	2	.....
IX. Diseases of the bones and the organs of locomotion	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
X. Malformations	16	16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	7	..	4	2	1	4	2	1	1	1	.....	.....	.....
XI. Diseases of early infancy..	272	155	117	..	16	24	20	20	21	20	25	28	30	28	23	17
XII. Old age	150	83	67	..	20	9	15	16	16	14	9	13	9	12	4	13
XIII. Affections produced by external causes	170	9	4	1	6	3	9	7	9	38	22	27	9	7	6	10	3	133	37	..	10	6	12	12	14	21	20	12	20	11	15	17
XIV. Ill-defined diseases	15	3	1	2	1	1	3	1	1	1	1	10	5	..	1	3	1	2	1	1	1	1	2	2
Still-Births (not included in totals).....	232	138	94	..	24	16	26	18	21	14	16	18	19	26	12	22

No. 10.

Diseases in each County, 1916.

Cities and Towns.

Last column shows totals of individual diseases, including Cities and Towns, 1916.

[illegible]

TABLE
Showing Total Deaths by Individual
N.B.—First line shows totals including Cities and Towns. Second line shows totals excluding

CAUSES OF DEATH.	Total.	Algoma.	Brant.	Bruce.	Carleton.	Dufferin.	Elgin.	Essex.	Frontenac.	Grey.	Haldimand.	Haliburton.	Halton.	Hastings.	Huron.	Kenora.
II.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.																
Group Total	2,140	18	22	89	45	13	57	59	21	47	22	5	35	64	88	6
60. Encephalitis	22	...	...	...	...	...	...	2	...	1	1	...	...	1	...	...
61. Simple Meningitis	183	3	...	6	1	...	5	6	...	3	1	...	7	6	5	2
62. Locomotor Ataxia	21	...	...	1	...	...	1	1	...	...	...	...	1	1	1	...
63. Other diseases of the spinal cord	89	...	3	3	4	...	6	4	...	2	1	...	1	5	5	...
64. Cerebral hæmorrhage, apoplexy	857	7	12	32	17	4	24	26	11	18	8	1	13	29	52	3
65. Softening of the brain	30	...	...	3	...	...	2	...	...	1	...	1	1	1	3	...
66. Paralysis without specified cause	360	4	2	26	9	6	13	7	2	11	5	...	2	6	9	...
67. General Paralysis of the Insane.....	27	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...
68. Other forms of mental alienation	68	...	1	...	...	...	1	3	4	...	...	...	...	1	1	...
69. Epilepsy	117	...	1	3	4	...	2	2	1	2	1	...	1	1	3	...
70. Convulsions (non-puerperal)	19	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...
71. Convulsions of infants	248	4	1	11	7	3	1	7	2	6	2	2	7	7	4	1
72. Chorea	8	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
73. Neuralgia and neuritis	19	...	1	...	2	...	...	1	...	...	...	...	1	1	2	...
74. Other diseases of the nervous system ...	65	...	1	3	1	...	2	...	1	2	2	1	1	3	1	...
75. Diseases of the eyes and their adnexa..	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
76. Diseases of the ears	4	...	...	1	...	...	...	...	...	...	1	...	...	...	...	...
III.—DISEASES OF THE CIRCULATORY SYSTEM.																
Group Total	2,639	26	40	90	69	33	51	76	45	75	45	6	47	62	107	1
77. Pericarditis	6	...	...	1	...	...	...	2	...	...	...	...	...	...	...	...
78. Acute Endocarditis.....	27	1	...	2	...	...	...	...	...	...	...	...	...	...	3	...
79. Organic diseases of the heart	1,850	20	24	62	50	30	33	47	35	64	39	5	34	56	74	...
80. Angina Pectoris ..	65	...	...	1	...	...	2	3	...	1	1	...	7	1	4	...
81. Diseases of the Arteries, atheroma, aneu- rysm, etc.....	622	5	16	20	18	3	15	22	9	10	5	1	6	5	22	1
82. Embolism and Thrombosis	50	...	...	2	1	...	1	2	1	...	...	...	...	...	4	...
83. Diseases of the veins (varices, hæmorr- hoids, phlebitis, etc.).....	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
84. Diseases of the lymphatic system (lymph- angitis, etc.)	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
85. Hæmorrhage; other diseases of the circula- tory system	11	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...
IV.—DISEASES OF THE RESPIRATORY SYSTEM.																
Group Total	2,389	43	41	78	63	31	31	81	40	61	36	5	43	67	66	3
87. Diseases of the Larynx	28	1	...	1	...	...	...	...	...	1	...	...	...	...	...	...
88. Diseases of the Thyroid Body	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
89. Acute Bronchitis	115	1	1	4	2	2	...	4	1	2	...	...	4	3	5	...
90. Chronic Bronchitis	213	5	5	8	5	4	1	3	3	10	5	...	...	5	7	...
91. Broncho-Pneumonia	366	7	6	10	9	3	2	17	7	8	6	1	8	7	6	1
92. Pneumonia	1,439	28	21	48	41	20	20	53	26	33	23	3	25	42	40	2
93. Pleurisy	61	...	4	3	3	...	2	...	2	3	...	...	4	3	2	...
94. Pulmonary congestion, pulmonary apoplexy	70	...	1	2	1	1	2	4	1	...	1	...	1	3	3	...
95. Gangrene of the Lung	3	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...
96. Asthma	77	...	2	2	1	...	4	...	...	4	1	1	1	4	1	...
97. Pulmonary Emphysema.....	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
98. Other diseases of the respiratory system (tuberculosis excepted).....	12	1	1	...	1	...	...	...	...	...	...	...	...	...	2	...
V.—DISEASES OF THE DIGESTIVE SYSTEM.																
Group Total	240	18	9	39	40	10	23	45	15	28	21	2	6	28	33	3
99. Diseases of the Mouth and adnexa	3	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...
100. Diseases of the Pharynx	16	...	...	...	...	...	...	1	...	1	1	...	...	...	...	...
101. Diseases of the Oesophagus.....	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
102. Ulcer of the Stomach	45	...	1	3	2	...	...	...	3	2	1	...	...	2	5	...
103. Other diseases of the Stomach (cancer excepted).....	134	2	2	4	1	2	3	1	1	2	6	...	1	7	2	...
104. Diarrhœa and Enteritis (under 2 years)..	415	6	2	4	26	...	9	23	3	3	4	...	2	8	4	1
105. Diarrhœa and Enteritis (2 years and over)	108	5	2	5	5	...	...	5	1	5	4	...	...	3	1	4
107. Intestinal Parasites .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
108. Appendicitis and typhlitis	102	1	...	5	2	1	2	4	1	5	...	1	...	1	4	...
109. Hernias, Intestinal Obstructions.....	140	2	1	8	1	1	5	4	4	6	1	...	3	1	7	...

No. 10.—Continued.
Diseases in each County, 1916—Continued.
Cities and Towns. Last column shows totals of individual diseases including Cities and Towns, 1916.

Kent.	Lambton.	Lanark.	Leeds and Grenville.	Lennox and Addington.	Lincoln.	Manitoulin.	Middlesex.	Muskoka.	Nipissing.	Norfolk.	Northumberland and Durham.	Ontario.	Oxford.	Parry Sound.	Peel.	Perth.	Peterborough.	Prescott and Russell.	Prince Edward.	Rainy River.	Renfrew.	Simcoe.	Stormont, Dundas and Glengarry.	Sudbury.	Thunder Bay.	Timiskaming.	Victoria.	Waterloo.	Welland.	Wellington.	Wentworth.	York.	Grand Total, including Cities and Towns.	Numbers.	
65	52	38	75	33	31	6	75	21	17	43	68	59	52	21	28	49	22	70	33	13	53	85	87	18	2	24	27	59	49	70	88	116	3,898	60	
1	6	5	4	2	2	...	1	1	2	3	1	1	1	1	...	2	...	...	...	...	2	1	1	...	...	1	...	1	...	2	...	1	56	61
...	...	1	3	...	...	...	2	...	...	...	...	1	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	44	62
4	4	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	161	63
24	29	16	33	16	13	6	35	6	5	19	34	29	17	8	13	21	8	14	14	2	21	24	42	2	1	7	11	23	17	31	24	35	1,485	64	
1	...	2	1	...	...	...	2	...	...	...	1	1	...	...	...	...	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	2	46	65
13	6	7	9	2	10	...	15	7	2	5	9	6	10	...	8	8	5	14	5	4	9	17	13	1	...	2	7	12	6	17	11	18	598	66	
...	2	8	6	67
3	2	...	9	...	...	...	...	...	1	3	...	2	3	1	...	...	1	1	...	...	1	...	2	...	...	...	...	...	...	...	21	7	112	68
2	1	...	6	3	1	...	2	...	1	1	1	1	14	...	1	1	1	4	2	1	2	18	5	1	...	...	1	2	5	...	12	7	169	69
1	1	...	1	1	...	...	1	...	...	...	...	1	...	...	1	...	...	1	...	...	1	1	1	1	1	...	...	...	1	2	1	...	28	70
6	2	3	1	4	4	...	7	4	5	5	11	7	3	4	1	3	3	10	4	3	7	9	9	6	...	8	2	15	9	6	6	17	494	71	
...	...	2	1	1	2	14	72
1	...	...	2	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	24	73
3	2	1	1	...	...	...	3	...	...	2	1	2	...	2	...	3	...	3	1	...	1	3	1	1	...	3	...	3	1	4	3	3	136	74
...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	3	75
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	26	76
72	55	63	114	39	47	10	124	25	16	62	80	63	55	40	31	60	37	49	45	5	49	103	111	16	5	22	41	49	53	107	75	123	4,718		
...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	1	14	77
55	39	45	83	25	37	7	84	15	15	43	58	37	40	28	21	31	27	33	34	4	32	69	80	12	3	17	30	28	36	78	50	81	3,075	79	
1	...	1	2	1	...	...	2	3	...	5	1	2	...	...	...	5	...	1	2	...	2	...	2	...	...	...	...	5	1	2	2	3	135	80
13	16	15	25	12	8	2	36	5	...	34	16	23	13	8	9	21	10	13	6	...	13	33	22	2	2	1	9	12	15	23	18	29	1,204	81	
1	...	2	2	...	1	...	1	1	...	...	1	1	...	2	...	1	...	...	2	1	...	1	5	1	...	4	2	2	1	2	1	4	111	82
1	...	...	1	...	...	...	...	...	...	...	1	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	20	83
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11	84
...	...	...	...	...	...	...	1	...	...	...	1	...	...	1	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	3	1	37	85
62	84	43	58	18	34	15	76	46	26	32	82	43	53	52	36	37	30	105	34	7	50	100	98	31	5	56	26	52	63	52	51	143	4,900		
3	2	1	...	...	1	...	1	...	2	...	...	...	...	...	...	...	...	1	1	...	2	2	1	...	...	1	...	...	1	...	2	4	58	87
...	1	11	88
1	...	3	1	...	4	1	3	2	4	...	2	3	2	2	3	...	3	7	1	...	3	4	10	2	...	2	1	10	3	2	2	5	275	89	
6	10	5	8	2	4	4	1	5	...	5	11	3	5	4	7	5	4	7	4	...	2	5	10	...	1	3	2	7	4	2	5	11	315	90	
9	8	13	11	5	5	3	6	5	2	7	21	7	7	7	3	4	1	26	1	...	10	4	17	12	...	25	1	8	6	5	4	25	887	91	
41	60	17	28	9	20	5	53	30	14	17	42	25	36	33	18	27	16	48	25	6	28	76	53	16	4	21	17	26	45	38	28	87	2,912	92	
1	1	...	3	...	...	...	3	1	1	2	2	2	...	1	2	...	2	1	...	...	3	1	2	...	...	...	...	...	3	2	1	3	125	93
1	1	2	1	...	...	2	2	1	2	1	3	1	...	2	2	...	2	13	1	...	1	...	...	1	...	...	...	1	...	2	2	6	143	94
...	...	1	5	2	...	...	4	2	...	...	1	2	...	1	3	1	1	1	1	...	1	7	4	...	...	1	3	...	1	1	7	1	6	95
...	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	9	97
...	1	...	...	...	...	...	1	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	1	20	98
32	30	11	30	11	25	7	42	16	36	17	42	24	19	17	11	20	15	108	16	7	40	40	42	18	5	48	16	28	43	34	21	49	2,968		
...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	12	99
1	...	...	...	...	...	...	3	1	...	...	...	1	...	...	1	...	...	1	...	...	2	...	1	...	...	...	...	...	...	1	...	...	37	100
...	...	...	...	...	...	...	...	...	...	...	2	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	10	101
1	1	...	1	3	...	2	...	...	...	...	...	1	1	2	...	...	...	...	...	...	1	2	1	...	1	1	1	1	3	2	1	1	89	102
...	3	2	8	3	3	2	4	2	2	1	10	1	2	...	...	3	4	4	5	...	6	5	7	3	...	5	3	4	3	3	1	1	248	103
16	12	1	4	2	10	3	10	1	22	4	6	4	3	4	2	1	2	71	3	3	11	8	16	10	4	19	1	10	22	4	8	23	1,218	104	
5	2	1	3	1	1	...	5	2	2	2	2	...	...	1	...	...	1	14	1	...	4	3	2	3	...	7	...	...	2	1	4	2	201	105
...	...	3	3	1	...	2	3	2	...	...	6	...	2	3	2	6	4	4	...	1	4	4	3	1	...	7	3	3	1	4	...	1	107	107
...	4	1	4	2	4	...	8	2	3	4	6	4	1	3	2	3	2	2	4	1	1	3	6	1	...	4	3	1	5	8	...	4	310	109	

TABLE
Showing Total Deaths by Individual

N.B—First line shows totals, including Cities and Towns, Second line shows totals excluding Cities

CAUSES OF DEATH.	Total.													
		Algoma.	Brant.	Bruce.	Carleton.	Dufferin.	Elgin.	Essex.	Frontenac.	Grey.	Haldimand.	Haliburton.	Halton.	Hastings.
														Huron.
														Kenora.
V.—DISEASES OF THE DIGESTIVE SYSTEM—Con.														
110. Diseases of the Intestines.....	32							1	1					1
111. Acute Yellow Atrophy of the Liver														
113. Cirrhosis of the Liver	54		1		3	3		2		2	2			1
114. Biliary Calculi	5			1										1
115. Other Diseases of the Liver.....	64			3			2	2		2	1			3
116. Diseases of the Spleen	4													3
117. Simple Peritonitis (non-puerperal).....	109	2		5		3	1	2	1		1	1		2
118. Other diseases of the digestive System (cancer and tuberculosis excepted)	3													5
VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.														
Group total	772	9	9	31	13	12	25	29	8	18	6	2	16	17
119. Acute Nephritis.....	78	2	3	3	2		1	5	2	1			1	3
120. Bright's Disease.....	508	6	4	23	8	10	19	21	5	15	5	1	12	10
121. Chyluria	3													
122. Other Diseases of the Kidneys and Adnexa...	50				1		1		1	2			1	2
123. Calculi of the Urinary Passages	13				1	1	1							3
124. Diseases of the Bladder	33	1		1								1	1	1
125. Diseases of the Urethra, Urinary Abscess, etc.														
126. Diseases of the Prostate.....	77		2	4	1	1	3	3			1		1	1
127. Non-veneraldiseases of the male genital organs														5
129. Uterine Tumor (non-cancerous).....	4													
130. Other Diseases of the Uterus.....	2													2
131. Cysts and other Tumors of the Ovary	3													1
132. Salpingitis and other Diseases of the Female Genital Organs.....	1													
133. Non-puerperal Diseases of the Breast (Cancer excepted)														
VII.—THE PUERPERAL STATE.														
Group total	140	4	4	5	5	1	2	4	3	4	1	1		2
134. Accidents of Pregnancy	20		1	1			1		1	1				1
135. Puerperal Hæmorrhage	12	3		1										
136. Other Accidents of Labor.....	31		1	2	2					1				1
137. Puerperal Septicæmia.....	37	1			2	1		2	1	2	1	1		2
138. Puerperal Albuminuria and Convulsions.....	38		1	1	1		1	2	1					3
139. Puerperal Phlegmasia Alba Dolens, Embolus, Sudden Death.....	2		1											1
140. Following Childbirth (not otherwise defined)														
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE														
Group total	140		3	3	1	1	2	6	2	7	1		2	3
142. Gangrene.....	107		2	1	1	1	2	5	2	5	1		1	3
143. Furuncle.....	3									1				4
144. Acute Abscess.....	25		1	2				1		1			1	
145. Other Diseases of the Skin and Adnexa.....	5													2
IX.—DISEASES OF THE BONES AND OF THE ORGANS OF LOCOMOTION														
Group total	9			3										
146. Diseases of the Bones (tuberculosis excepted)	8			3										
147. Diseases of the Joints (tuberculosis and rheumatism excepted)	1													
149. Other Diseases of the Organs of Locomotion														
X.—CONGENITAL MALFORMATIONS.														
Group total	99		4	5	3	2	1	3	3	7		2	1	3
150. Congenital Malformations (still-births not included).....	99		4	5	3	2	1	3	3	7		2	1	3

No. 10.—Continued.

Diseases in each County, 1916—Continued.

and Towns. Last column shows totals of individual diseases including Cities and Towns, 1916,

Kent.	Lambton.	Lanark.	Leeds and Grenville.	Lennox and Addington.	Lincoln.	Manitoulin.	Middlesex.	Muskoka.	Nipissing.	Norfolk.	Northumberland and Durham.	Ontario.	Oxford.	Parry Sound.	Peel.	Perth.	Peterborough.	Prescott and Russell.	Prince Edward.	Rainy River.	Renfrew	Simcoe.	Stormont, Dundas and Glengarry.	Sudbury.	Thunder Bay.	Timiskaming.	Victoria.	Waterloo.	Welland.	Wellington.	Wentworth.	York.	Grand total, including Cities and Towns.	Numbers.
1 3 3 3 2	1 1 1 2 1	1 4 1 3 2	1 4 1 3 3	1 1 1 3 1	1 1 1 3 3	1 3 3 3 3	1 3 3 4 3	2 1 1 3 3	1 1 1 3 4	2 1 1 4 4	2 1 3 5 4	2 1 1 1 5	2 4 1 3 3	1 1 1 1 1	1 1 1 1 1	2 1 1 3 3	2 1 1 1 1	2 1 4 8 1	2 2 2 1 1	2 1 1 1 1	1 1 4 6 6	2 2 4 4 1	2 2 1 1 1	2 2 1 1 1	3 3 1 3 4	1 2 2 3 3	1 2 2 1 1	3 3 2 3 1	1 3 2 1 1	6 2 3 1 5	66 120 17 149 5 234	110 113 114 115 116 117		
21	17	16	27	16	10	3	22	10	4	11	33	10	30	7	16	26	7	29	25	3	16	32	25	3	2	11	9	12	19	22	20	29	1,596	
2	1	3	3	1	1	1	1	1	1	1	5	1	2	2	2	1	1	4	1	2	1	2	2	1	2	3	2	2	1	5	3	198	119	
10	14	11	18	10	6	1	15	6	3	10	18	6	15	5	9	20	6	17	15	1	9	23	18	1	6	7	8	17	17	10	18	1,027	120	
3	1	1	1	1	1	1	2	1	1	1	2	1	4	1	1	3	1	3	1	1	3	3	3	1	1	1	1	1	1	3	2	93	122	
1	1	1	1	1	1	1	1	1	1	1	2	1	3	1	1	1	1	3	4	1	3	2	1	2	1	1	1	1	1	1	1	56	124	
2	2	1	4	3	1	1	1	4	1	1	5	2	4	2	1	1	2	4	1	1	1	1	1	1	2	1	1	2	3	1	3	133	126	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	129	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8	130	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11	131	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13	132	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	133
8	3	2	3	1	3	2	2	4	3	3	6	3	3	2	2	3	3	1	1	4	4	6	2	1	2	2	5	7	4	7	328			
2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	50	134	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21	135	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	56	136	
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	112	137	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	78	138	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10	139	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	140	
3	2	3	5	1	1	1	5	1	4	5	3	4	3	3	3	3	2	5	3	3	3	7	7	2	1	3	6	2	8	3	6	247		
2	2	2	2	1	1	1	4	1	3	3	3	2	1	1	3	3	2	4	3	3	3	6	7	1	1	2	2	2	8	2	5	176	142	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7	143	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	49	144	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	145	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	22		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	146	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	147	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	149		
6	4	2	1	1	1	2	3	1	1	1	3	1	2	2	3	2	3	1	1	1	3	2	4	1	1	1	1	4	4	3	5	236		
6	4	2	1	1	1	2	3	1	1	1	3	1	2	2	3	2	3	1	1	1	3	2	4	1	1	1	1	4	4	3	5	236	150	

TABLE
Showing Total Deaths by Individual

CAUSES OF DEATH.	Total.															
		Algoma.	Brant.	Bruce.	Carleton.	Dufferin.	Elgin.	Essex.	Frontenac.	Grey.	Haldimand.	Haliburton.	Halton.	Hastings.	Huron.	Kenora.
XI.—DISEASES OF EARLY INFANCY.																
Group total.....	1,578	20	16	44	50	15	7	45	...	40	31	14	21	47	45	6
151. Congenital Debility, Icterus, and Sclerema ..	1,554	17	16	43	49	15	7	45	...	40	30	14	21	47	45	6
152. Other Diseases peculiar to Early Infancy	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
153. Lack of Care.....	22	3	...	1	1	...	...	...	...	...	1	...	...	...	...	...
154. XII.—OLD AGE.																
Group total.....	1,932	16	38	70	33	19	36	42	48	90	30	11	22	56	84	2
XIII. AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																
Group Total	1,033	22	11	14	14	6	21	28	7	24	1	2	10	25	20	3
155. Suicide by poison	16	1	...	...	...	...	...	2	...	1	1	...	1	2	...	...
156. Suicide by asphyxia.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
157. Suicide by hanging or strangulation	25	...	...	1	1	1	...	1	...	...	...	...	...	1	...	...
158. Suicide by drowning.....	5	...	...	...	...	...	...	3	...	...	...	...	...	...	1	...
159. Suicide by firearms.....	5	...	...	...	2	...	...	1	...	...	...	...	...	...	...	...
160. Suicide by cutting or piercing instruments..	9	...	...	2	...	...	...	...	...	1	...	...	...	...	1	...
161. Suicide by jumping from high places.	2	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...
163. Other Suicides.....	12	...	...	...	...	...	1	...	...	...	...	...	...	...	2	...
164. Poisoning by food	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
165. Other acute poisonings.....	26	2	...	...	...	1	...	...	...	...	1	...	...	1	3	...
166. Conflagration	24	...	...	1	...	...	...	...	1	...	1	...	...	...	...	...
167. Burns (conflagration excepted).....	146	1	...	...	...	...	2	...	...	1	...	1	...	1	1	...
168. Absorption of Deleterious Gases (conflagra- tion excepted)	30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
169. Accidental Drowning.....	196	6	4	2	7	...	9	12	3	6	1	...	3	5	3	...
170. Traumatism by firearms	35	6	...	...	3	...	...	1	...	...	...	...	1	3	...	...
171. Traumatism by cutting or piercing instru- ments .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
172. Traumatism by fall	42	...	1	2	...	1	1	1	...	...	...	...	...	...	...	...
173. Traumatism in mines and quarries.....	26	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...
174. Traumatism by machines.....	10	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
175. Traumatism by other crushing.....	127	2	2	1	...	1	3	1	...	4	2	...	...	4	...	1
176. Injuries by animals	19	...	...	...	...	1	...	...	...	1	...	...	...	2	1	...
177. Starvation	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
178. Excessive cold.....	6	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
179. Effects of heat.....	19	...	...	...	...	...	...	...	...	1	...	1	...	2	...	...
180. Lightning	10	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...
181. Electricity (Lightning excepted).....	12	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...
182. Homicide by firearms	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
183. Homicide by cutting or piercing instruments	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
184. Homicide by other means	4	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...
185. Fractures (cause not specified).....	102	2	1	2	1	...	1	3	2	4	3	...	3	1	5	1
186 Other external violence.....	117	...	3	1	...	1	2	3	...	5	2	...	1	2	3	...
XIV.—ILL-DEFINED DISEASES.																
Group Total	188	2	1	5	2	...	3	6	5	5	5	2	1	6	2	...
187. Ill-defined organic disease.....	9	...	...	...	1	...	...	...	1	...	1	...	...	...	1	...
188. Sudden death.....	32	...	...	...	1	...	1	2	...	2	4	...	...	2	...	...
189. Cause of death not specified or ill-defined...	147	2	1	5	...	...	2	4	4	3	...	2	1	4	1	...
STILL-BIRTHS.																
Not included in Totals	1,134	14	17	43	30	10	15	37	13	38	15	6	13	27	41	4

No. 10.—Concluded.
Diseases in each County, 1916.—Concluded.

Kent.	Lambton.	Lanark.	Leeds and Grenville.	Lennox and Addington.	Lincoln.	Manitoulin.	Middlesex.	Muskoka.	Nipissing.	Norfolk.	Northumberland and Durham.	Ontario.	Oxford.	Parry Sound.	Peel.	Perth.	Peterborough.	Prescott and Russell.	Prince Edward.	Rainy River.	Renfrew.	Simcoe.	Stormont, Dundas and Glengarry.	Sudbury.	Thunder Bay.	Timiskaming.	Victoria.	Waterloo.	Welland.	Wellington.	Wentworth.	York.	Grand Total including Cities and Towns.	Numbers.
54	33	25	37	16	21	18	26	21	33	19	50	28	25	37	18	23	24	112	7	11	73	67	50	60	12	56	16	29	20	33	24	90	3,238	
54	33	25	35	14	20	18	26	21	32	19	48	26	25	37	18	22	23	112	7	11	72	67	49	60	12	54	16	28	29	33	24	89	3,104	151
..	..	..	1	2	1	..	..	..	1	..	2	2	..	..	..	1	1	..	..	..	1	..	1	..	..	1	..	..	..	..	..	1	98	152
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	36	153
53	70	51	73	27	24	15	46	18	13	36	69	51	65	19	20	38	24	39	36	2	66	101	62	10	5	7	25	51	25	73	38	83	2,655	154
26	26	11	23	9	24	8	25	4	17	30	23	23	10	19	15	16	12	19	5	13	20	34	36	25	12	179	8	20	41	23	20	39	1,926	
2	1	..	1	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	41	155
..	..	..	..	1	..	..	1	..	..	1	1	3	1	1	1	..	..	..	..	..	..	..	2	..	..	..	1	3	..	1	..	..	36	157
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	7	158
1	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	13	159
1	..	1	1	1	..	..	2	..	..	2	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	19	160
..	1	1	1	..	..	..	..	..	..	2	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	161
..	1	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	15	163
..	1	..	1	..	..	..	1	..	1	..	..	..	..	1	..	..	..	2	1	1	..	2	2	2	..	2	..	..	..	..	..	..	8	164
1	..	..	..	..	..	..	1	..	5	..	..	..	..	..	1	..	..	..	..	..	..	2	1	1	..	2	..	..	..	..	..	1	62	165
3	2	..	1	..	2	1	3	..	1	..	2	..	3	2	1	..	..	1	2	1	1	3	..	5	97	..	..	..	1	1	..	2	38	166
1	..	..	..	..	1	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	1	..	..	22	..	..	2	..	..	..	..	67	168
2	6	2	2	..	6	2	2	3	3	11	3	3	..	7	3	..	6	2	..	5	6	4	7	2	13	1	3	10	3	3	15	324	169	
2	2	..	3	..	..	1	3	..	..	1	2	..	..	..	..	..	1	1	..	..	1	..	2	..	..	..	..	1	1	..	..	..	57	170
1	..	2	..	3	1	2	..	..	..	..	..	1	1	1	1	2	1	1	..	..	1	2	2	1	..	4	1	1	2	2	..	3	2	171
..	1	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	2	2	5	..	13	..	..	..	2	..	..	94	172
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	1	..	..	..	..	3	..	1	..	36	173
8	4	..	6	2	4	..	..	..	1	6	2	3	2	4	6	3	1	3	..	6	7	5	8	3	3	2	..	..	4	3	4	6	267	175
1	1	..	1	..	1	..	1	..	..	1	..	1	..	..	..	1	..	..	..	1	2	1	..	..	1	..	..	1	2	..	..	..	23	176
..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	1	..	..	..	..	..	..	..	3	177
..	2	..	..	..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	3	2	..	..	1	1	1	..	..	..	..	8	178
..	..	1	..	..	1	..	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	44	179
..	1	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	1	..	..	..	1	..	1	..	..	..	..	..	..	12	180
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	26	181
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	3	182
..	1	4	2	1	2	..	2	..	..	3	3	2	..	1	2	4	..	1	1	2	1	3	4	2	..	5	3	5	3	3	7	6	9	184
3	2	1	4	1	6	1	6	..	3	1	6	5	2	2	..	3	2	6	..	1	2	4	1	4	1	4	1	5	9	5	1	2	221	185
..
5	3	2	1	..	2	6	..	1	14	2	2	4	1	2	..	..	2	21	1	..	9	13	3	16	9	4	2	3	4	3	5	3	338	
1	..	1	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	2	..	..	..	..	..	26	187
..	1	1	..	..	1	..	..	1	1	1	..	..	1	1	..	..	..	1	..	..	..	2	2	..	..	1	..	1	1	3	1	..	50	188
4	2	1	1	..	1	6	..	..	13	1	1	4	..	1	..	..	2	20	1	..	8	11	1	16	9	3	2	1	3	2	2	2	262	189
34	35	24	12	4	14	7	28	15	17	27	43	34	24	11	15	17	20	30	12	13	27	35	29	23	2	36	17	28	29	23	27	99	2,518	

TABLE No. 11.—Continued.

OFFICIAL ENGLISH TRANSLATION. (DISEASES AND CAUSES OF DEATH.)		Total.	Belleville.	Brantford.	Chatham.	Fort William.	Galt.	Guelph.	Hamilton.	Kingston.	Kitchener.	London.	Niagara Falls.	Ottawa.	Peterborough.	Port Arthur.	St. Catharines.	St. Thomas.	Sarnia.	Sault Ste. Marie.	Stratford.	Toronto.	Windsor.	Woodstock.
VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.																								
Group Total		721	6	12	14	3	11	11	76	25	11	58	9	86	11	7	15	15	11	8	10	295	22	5
119. Acute Nephritis	105	..	2	4	2	1	2	..	9	2	3	8	..	21	1	..	..	1	2	3	1	40	3	..
120. Bright's Disease	453	6	4	5	..	7	8	..	52	18	6	40	9	48	8	7	14	11	7	3	6	172	17	5
122. Other Diseases of the Kidneys and Adnexa	39	..	2	2	..	2	..	..	3	1	..	4	..	1	2	..	..	..	..	2	..	19	1	..
123. Calculi of the Urinary Passages	20	..	..	1	1	..	..	..	1	1	..	1	..	4	..	..	..	2	..	1	..	8	..	..
124. Diseases of the Bladder	16	..	..	..	..	..	..	..	1	..	..	1	..	4	..	..	..	..	..	..	10	..	..	..
125. Diseases of the urethra, urinary abscess, etc.	2	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..
126. Diseases of the Prostate	50	..	3	1	..	..	1	..	8	2	2	4	..	5	..	..	..	..	2	..	1	21	..	..
127. Non-veneraeal Diseases of the Male Genital Organs.....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..
129. Uterine Tumor (non-Cancerous)	9	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	6	1	..
130. Other Diseases of the Uterus	5	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	1	..	..	..	2	..	..	..
131. Cysts and other Tumors of the Ovary	8	..	1	..	..	..	..	..	1	1	..	..	..	1	..	..	..	..	..	..	4	..	..	..
132. Salpingitis and other Diseases of the Female Genital Organs	12	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	10	..	..	..
133. Non-puerperal disease of the breast (cancer excepted).....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..
VII.—THE PUERPERAL STATE.																								
Group Total.....		154	2	2	1	3	3	3	17	7	2	11	1	12	2	2	3	4	5	2	2	63	5	2
134. Accidents of Pregnancy.....	24	..	1	..	1	..	2	..	1	1	1	1	1	1	..	2	..	..	..	1	1	9	1	..
135. Puerperal Hæmorrhage	7	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	1	..	..	2	1	1	..
136. Other Accidents of Labor	18	..	..	..	1	..	..	..	2	1	..	2	..	1	..	..	..	..	..	..	10	..	1	..
137. Puerperal Septicæmia	65	..	1	..	..	2	1	..	13	3	1	2	..	7	1	..	2	1	4	1	..	25	1	..
138. Puerperal Albuminuria and Convulsions .	31	1	..	1	..	1	..	..	..	2	..	6	..	2	1	..	..	2	..	1	12	2	..	..
139. Puerperal Phlegmasia Alba Dolens, Embolus, Sudden Death	8	1	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	4	..	..	..
140. Following Childbirth (not otherwise defined).....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.																								
Group Total.....		87	..	1	..	..	..	1	9	4	2	7	2	13	1	..	2	1	2	2	3	34	3	..
142. Gangrene	54	..	..	..	..	..	1	..	5	4	1	6	..	7	1	..	2	1	2	1	3	17	3	..
143. Furuncle.....	3	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	2	..	..	..
144. Acute Abscess	21	..	1	..	..	..	..	..	4	..	1	..	..	5	..	..	..	..	..	..	10	..	..	..
145. Other Diseases of the Skin and Adnexa ..	9	..	..	..	..	..	..	..	..	..	..	1	1	1	..	..	..	..	1	..	5	..	..	..
IX.—DISEASES OF THE BONES AND OF THE ORGANS OF LOCOMOTION.																								
Group Total.....		12	..	..	..	..	..	..	1	..	1	1	..	2	..	1	..	..	..	..	..	6	..	..
146. Diseases of the Bones (tuberculosis excepted)	7	..	..	..	..	..	..	..	1	..	1	1	..	2	..	1	..	..	..	..	..	1	..	..
147. Diseases of the Joints (tuberculosis and rheumatism excepted)	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..
149. Other Diseases of the Organs of Locomotion.....	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..
X.—MALFORMATIONS.																								
Group Total.....		121	1	5	2	..	..	2	5	3	2	3	..	14	2	..	1	1	3	2	1	69	4	1
150. Congenital malformations (stillbirths not included)	121	1	5	2	..	..	2	..	5	3	2	3	..	14	2	..	1	1	3	2	1	69	4	1

TABLE No. 11.—Concluded.

OFFICIAL ENGLISH TRANSLATION. (DISEASES AND CAUSES OF DEATH.)		Total.	Belleville.	Brantford.	Chatham.	Fort William.	Gat.	Guelph.	Hamilton.	Kingston.	Kitchener.	London.	Niagara Falls.	Ottawa.	Peterborough.	Port Arthur.	St. Catharines.	St. Thomas.	Sarnia.	Sault Ste. Marie.	Stratford.	Toronto.	Windsor.	Woodstock.
XI.—DISEASES OF EARLY INFANCY.																								
Group Total.....		1,388	12	29	16	31	9	25	134	51	25	80	12	229	33	19	31	8	11	19	25	526	53	10
151. Congenital Debility, Icterus and Sclerema		1,280	12	29	15	31	9	24	129	50	25	78	12	225	33	18	31	8	11	19	25	433	53	10
152. Other Diseases peculiar to Early Infancy		96	..	..	1	..	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	92	..	..
153. Lack of Care		12	..	..	..	..	..	..	5	1	..	..	..	4	..	1	..	..	..	..	..	1	..	..
154. XII.—OLD AGE.																								
Group Total.....		573	18	31	16	3	15	15	45	22	11	52	6	70	32	3	19	20	11	6	16	144	7	11
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																								
Group Total.....		723	12	19	19	39	11	5	73	21	4	40	19	74	26	12	18	11	9	19	8	256	18	10
155. Suicide by Poison		20	1	..	..	..	..	..	2	..	..	1	..	1	1	1	1	..	1	..	..	10	1	..
156. Suicide by Asphyxia		7	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	6	..	..
157. Suicide by Hanging or Strangulation		10	..	..	..	..	1	..	2	..	..	..	..	1	..	..	..	..	..	..	..	6	..	..
158. Suicide by Drowning		1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
159. Suicide by Firearms		7	..	..	..	..	..	..	1	..	..	1	..	1	..	..	..	1	..	1	..	2	..	..
160. Suicide by Cutting or Piercing Instruments		9	1	..	..	..	..	..	2	1	..	..	..	1	..	2	..	..	..	..	..	2	..	..
163. Other Suicides		2	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
164. Poisoning by Food		6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	..	..
165. Other Acute Poisonings.....		29	..	2	1	..	..	..	1	..	1	..	..	2	..	1	..	1	1	..	19	..	..	..
166. Conflagration		14	..	1	..	5	..	..	1	..	..	..	..	6	..	1	..	..	..	..	..	..	..	..
167. Burns (conflagration excepted)		84	1	3	1	5	1	..	6	..	..	3	2	9	10	2	6	..	3	1	1	27	..	3
168. Absorption of Deleterious Gases (conflagration excepted).....		34	..	1	..	..	..	..	1	..	..	1	..	2	1	..	1	1	1	1	..	24	..	..
169. Accidental Drowning		89	3	3	1	7	2	1	6	6	1	7	8	10	3	2	1	..	1	4	..	22	1	..
170. Traumatism by Firearms		16	..	..	..	2	..	..	1	2	1	2	..	..	..	..	2	..	1	1	..	2	2	..
171. Traumatism by cutting or piercing instruments.....		2	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
172. Traumatism by Fall		45	..	..	5	1	1	1	3	..	..	2	..	6	1	..	..	3	..	..	..	20	..	2
173. Traumatism in Mines and Quarries		8	..	1	..	3	..	..	1	..	..	..	1	1	..	..	..	..	1	..	..	..	..	..
174. Traumatism by Machines.....		12	..	2	1	..	..	..	1	..	..	2	..	1	..	..	..	..	..	..	..	5	..	..
175. Traumatism by other Crushing (vehicles, railroad, landslides, etc.)		122	2	4	5	7	..	..	14	4	..	9	4	13	..	2	2	2	..	1	..	48	4	1
176. Injuries by Animals.....		4	..	..	1	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..
177. Starvation		1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
178. Excessive Cold		2	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
179. Effects of Heat		21	..	..	1	..	..	..	..	..	..	3	..	2	1	..	..	..	..	..	..	13	1	..
180. Lightning		2	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
181. Electricity (lightning excepted).....		10	1	..	..	..	..	..	2	..	..	..	..	1	1	..	..	..	..	..	..	5	..	..
184. Homicide by other means		3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	2	..	..
185. Fractures (cause not specified)		91	1	1	1	..	2	2	14	4	..	6	3	13	1	..	4	4	..	2	3	23	5	2
186. Other External Violence		72	..	3	1	6	2	..	16	1	..	2	..	4	7	1	1	..	3	4	3	12	4	2
XIV.—ILL-DEFINED DISEASES.																								
Group Total.....		135	..	5	2	4	1	1	4	6	..	10	..	15	..	..	2	..	1	2	..	80	1	1
187. Ill-Defined Organic Disease.....		14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	14	..	..
188. Sudden Death		15	..	..	..	..	..	..	..	..	..	2	..	8	..	..	2	..	..	..	..	3	..	..
189. Causes of Death not Specified or Ill-defined		106	..	5	2	4	1	1	4	6	..	8	..	7	..	..	..	..	1	2	..	63	1	1
STILL-BIRTHS.																								
Not included in totals.....		1,332	16	34	7	30	11	4	155	17	23	53	8	148	22	22	30	15	23	19	15	632	36	12

TABLE No. 12—Continued.

OFFICIAL ENGLISH TRANSLATION. (DISEASES AND CAUSES OF DEATH.)	Total.	Barrie.	Brockville.	Cobalt.	Cobourg.	Collingwood.	Cornwall.	Ingersoll.	Kenora.	Lindsay.	Midland.	North Bay.	Orillia.	Oshawa.	Owen Sound.	Parry Sound.	Pembroke.	Port Hope.	Smith's Falls.	Steeleton.	Sudbury.	Trenton.	Walkerville.	Welland.
III.—DISEASES OF THE CIRCULATORY SYSTEM.																								
Group Total	288	9	25	3	18	7	7	14	8	12	10	8	18	22	29	41	11	18	15	1	11	10	5	16
77. Pericarditis.....	2												1		1									
78. Acute Endocarditis.....	6		2										1		1							1	1	
79. Organic Diseases of the Heart.....	191	7	18	1	9	7	5	11	5	6	7	7	8	11	22	7	8	15	8	1	8	6	3	11
80. Angina Pectoris.....	8				1	1	1		1					2				1			1			
81. Diseases of the Arteries, Atheroma, Aneurysm, etc.....	65	2	4		7			1	3	3	2	1	7	9	6	2	2	3	6		1	2	1	3
82. Embolism and Thrombosis	10		1	1	1	1	1		1				1	1	1					1			1	
83. Diseases of the Veins (varices, hemorrhoids, phlebitis, etc).....	3									1	1													1
85. Hæmorrhage; other diseases of the circulatory system.....	3			1												1					1			
IV.—DISEASES OF THE RESPIRATORY SYSTEM.																								
Group Total	354	15	21	7	20	19	22	16	8	13	14	10	6	14	22	14	23	11	14	8	36	11	6	24
87. Diseases of the Larynx	6			1							1					2				1	1			
88. Diseases of the thyroid body.....	1												1											
89. Acute Bronchitis.....	22				4	1								2	1	5	3			2	1			
90. Chronic Bronchitis.....	21				1	3	3		4		1			1	2		2			1				1
91. Broncho-pneumonia.	73	1	3	2		6	2	1		4	4	1	3	5	6	1		4	2	14	3	2	9	
92. Pneumonia.....	206	12	16	4	15	9	15	14	7	7	8	4	4	7	10	4	12	6	10	3	18	5	4	12
93. Pleurisy.....	7		1								1				1	2				1			1	
94. Pulmonary Congestion, Pulmonary Apoplexy	4							1				1		1		1								
96. Asthma.....	11	2				2		1	1					2					1		2			
98. Other Diseases of the Respiratory System (Tuberculosis excepted)....	3		1						1					1										
V.—DISEASES OF THE DIGESTIVE SYSTEM																								
Group Total	264	7	13	7	4	10	25	6	2	9	7	18	8	15	12	10	22	5	21	4	23	7	2	27
99. Diseases of the mouth and adnexa....	2															1		1						
100. Diseases of the pharynx.....	4					1		1						1										1
101. Diseases of the oesophagus	2													1			1							
102. Ulcer of the Stomach.....	3					1		1																1
103. Other Diseases of the Stomach (Cancer Excepted).....	13		2		1	3	1	2		2											1			1
104. Diarrhœa and Enteritis (under 2 years)	119	2	6	5	1	1	12	2			3	10	2	6	2	8	13		13	3	14	4		13
105. Diarrhœa and Enteritis (2 years and over.)	10						2		1				1			2		2	1					1
ntestinal parasites	1																1							
108. Appendicitis and Typhlitis	27	2	1	1	1	6		1	1	1	1	1	1	3	1	1		1		3				3
109. Hernias, Intestinal Obstructions.	25	1	1	1			1		2		2	3	2	3	1	1		1			1	1	1	4
110. Diseases of the Intestines.....	9					2							1	1	1					3				1
111. Acute yellow atrophy of the liver...	1												1											
113. Cirrhosis of the Liver.....	6							1				1						2			1			1
114. Biliary calculi.....	1										1													
115. Other Diseases of the Liver.....	14	1			1	3								2	2		1	1			1			2
117. Simple Peritonitis (Non-puerperal)...	27	1	3			2	1		2	2	3		3			4	1	1		1	1			2
VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.																								
Group Total.....	103	10	11		4	3	8	8	2	3	4	4	9	2	3	2	8	3	5	1	6	3	4	
119. Acute Nephritis.....	15	1	2		1	1		1		1	2	1		1							2	1	1	
120. Bright's Disease.....	66	9	9		1	1	6	3	2	1	2	3	5	1	2	2	7	2	3		3	1	3	
122. Other Diseases of the Kidneys and Adnexa.....	4							1		1			1			1								
123. Calculi of the Urinary Passages.....	3						1	1								1				1				
124. Diseases of the bladder.....	7				2	1	1	1					1		1									
126. Diseases of the Prostate.....	6																1	2			1			
129. Uterin Tumor (non-cancerous)	1							1																
130. Other diseases of the uterus	1																				1			
VII.—THE PUERPERAL STATE.																								
Group Total.....	34	1	2	2	1	1		2			1	2	2	3	3	5	2		3		2			2
134. Accidents of pregnancy.....	6			1								2	1		1									1
135. Puerperal hæmorrhage.....	2					1								1										
136. Other accidents of labor.....	7		1					1							1	2	2							
137. Puerperal septicæmia.....	10	1		1							1		2	1	1			1		1				1
138. Puerperal albuminuria and convulsions.....	9		1		1			1			1	1			1			2		1				

TABLE No. 12—Concluded.

OFFICIAL ENGLISH TRANSLATION. (DISEASES AND CAUSES OF DEATH.)	Total.	Barrie.	Brockville.	Cobalt.	Cobourg.	Collingwood.	Cornwall.	Ingersoll.	Kenora.	Lindsay.	Midland.	North Bay.	Orillia.	Oshawa.	Owen Sound.	Parry Sound.	Pembroke.	Port Hope.	Smith's Falls.	Steeleton.	Sudbury.	Trenton.	Walkerville.	Wend.
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.																								
Group Total	27	1	6	....	2	2	3	..	..	..	..	..	..	1	..	1	2	..	..	..	1	..	..	1
142. Gangrene	15	....	5	....	..	1	3	..	..	..	..	..	..	1	..	1	2	..	..	..	1	..	..	1
143. Furuncle.....	1	....	1	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
144. Acute Abscess.....	3	1	....	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
145. Other diseases of the skin and adnexa.....	1	....	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
IX.—DISEASES OF THE BONES AND OF THE ORGANS OF LOCOMOTION.																								
Group Total	1	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..
146. Diseases of the Bones (tuberculosis excepted)	1	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..
X —CONGENITAL MALFORMATIONS.																								
Group Total	16	1	1	....	..	1	..	..	..	..	1	3	..	..	1	2	1	..	..	1	4	..	..	..
150. Congenital malformations (stillbirths not included)	16	1	1	....	..	1	..	..	..	..	1	3	..	..	1	2	1	..	..	1	4	..	..	..
XI.—DISEASES OF EARLY INFANCY.																								
Group Total	272	5	10	26	5	5	13	9	11	10	11	18	13	10	21	14	14	2	12	8	30	6	4	15
151. Congenital Debility, Icterus and Sclerema.....	210	5	10	26	5	5	13	9	10	10	11	18	13	10	21	14	14	2	12	7	30	6	4	15
153. Lack of care.....	2	....	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
154. XII.—OLD AGE.																								
Group Total	150	15	8	1	11	13	10	6	2	4	..	4	8	4	21	4	8	11	3	1	5	4	..	1
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																								
Group Total	170	5	6	6	5	2	5	1	17	9	3	9	2	4	4	11	9	5	5	7	31	6	3	15
155. Suicide by Poison.....	5	....	..	..	..	..	..	..	..	..	..	1	..	1	1	..	1	..	..	..	1	..	..	..
157. Suicide by hanging or strangulation	1	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..
158. Suicide by drowning.....	1	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..
159. Suicide by Firearms.....	1	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
160. Suicide by cutting or piercing instruments	1	....	1	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
163. Other Suicides.....	1	....	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
165. Other Acute Poisonings	7	....	1	....	..	..	2	..	1	..	..	..	..	..	..	1	..	..	..	1	..	..	1	..
167. Burns (Conflagration Excepted).....	16	1	....	..	1	..	..	3	..	..	..	..	..	..	6	..	1	..	..	3	..	..	1	..
168. Absorption of deleterious gases (conflagration excepted)	3	....	..	..	..	..	..	..	..	..	..	1	..	1	..	1	..	..	1	..	..	..	..	..
169. Accidental Drowning.....	39	2	2	..	1	1	3	..	5	3	..	4	1	..	3	2	1	1	1	2	2	1	..	4
170. Traumatism by Firearms	6	....	..	..	..	..	..	2	..	1	..	..	..	..	..	..	..	..	..	2	..	..	1	..
172. Traumatism by Fall.....	7	....	..	..	..	..	..	..	1	..	..	1	..	1	..	1	..	..	1	2	..	..	..	..
173. Traumatism in mines and quarries..	2	....	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..
174. Traumatism by machines	1	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
175. Traumatism by Other Crushing	18	1	1	..	..	..	..	3	1	1	..	..	..	..	1	..	..	..	2	7	..	1	..	..
179. Effects of Heat.....	4	....	..	2	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..
181. Electricity (lightning excepted).....	4	....	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	2	..
182. Homicide by firearms	1	....	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
184. Homicide by other means.....	2	....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
185. Fractures (Cause not Specified)....	18	1	....	1	2	..	1	2	..	..	..	..	..	..	1	2	..	1	2	..	7	..	1	..
186. Other External Violence.....	52	....	..	2	1	1	..	1	2	1	3	..	2	2	..	4	..	1	1	3	2	1	5	..
XIV.—ILL-DEFINED DISEASES.																								
Group Total.....	15	1	2	....	2	..	1	..	1	..	1	1	1	..	1	1	1	..	..	1	..	1	..	..
187. Ill-defined organic disease.....	3	....	..	..	2	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
188. Sudden death.....	3	....	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
189. Cause of Death not Specified or Ill-defined ..	9	1	....	..	..	..	..	1	..	..	1	1	1	..	1	1	1	..	..	..	..	1	..	..
STILL-BIRTHS.																								
Not included in totals.....	232	4	18	7	2	6	12	9	..	15	15	10	9	18	16	11	14	6	4	10	27	4	8	7

TABLE No. 13.
Infant Mortality—Deaths under 5 Years of Age, and Causes, 1916.

OFFICIAL ENGLISH TRANS- LATION. (DISEASES AND CAUSES OF DEATH.)		Entire Province.					Cities.					Towns.					Rural Municipalities.								
		Total.	Under 1 Yr.	1 Year.	2 Years.	3 Years.	4 Years.	Total.	Under 1 Yr.	1 Year.	2 Years.	3 Years.	4 Years.	Total.	Under 1 Yr.	1 Year.	2 Years.	3 Years.	4 Years.	Total.	Under 1 Yr.	1 Year.	2 Years.	3 Years.	4 Years.
Grand Total		9,352	7,000	1,245	542	328	237	4,361	3,286	574	247	144	110	819	609	124	44	28	14	4,172	3,105	547	251	156	113
I.—GENERAL DISEASES.																									
Group Total		1353	591	341	199	128	94	688	305	157	100	73	53	126	55	37	20	7	7	539	231	147	79	48	34
1. Typhoid fever		6	...	3	...	2	1	3	...	1	...	2	...	2	...	1	...	1	1	...	1	...	1
5. Smallpox		2	...	1	...	...	...	1	...	...	1	...	...	1	...	1	...	...	...	...	...	...	...	...
6. Measles		315	109	121	54	19	12	150	52	61	22	10	5	23	8	14	1	...	142	49	46	31	9	...	
7. Scarlet fever		27	2	7	5	8	5	22	...	7	3	7	5	2	...	1	1	...	3	2	...	1	...	...
8. Whooping cough		323	209	83	20	8	3	127	83	29	9	4	2	41	24	14	3	...	155	102	40	8	4	1	
9. Diphtheria and croup		22	24	39	60	56	50	128	16	19	29	32	32	25	4	3	10	5	3	76	4	17	21	19	15
10. Influenza		34	24	5	2	1	2	13	9	2	1	...	1	1	1	...	...	...	20	14	3	1	1	1
11. Miliary fever		1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...
13. Cholera nostras		2	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	2	...	...
14. Dysentery		28	21	3	2	2	...	12	10	...	1	1	...	...	...	...	...	...	16	11	3	1	1	...
18. Erysipelas		18	16	1	1	...	...	11	9	1	1	...	...	1	1	...	...	...	6	6	...	...	...	...
19. Other epidemic diseases		3	...	...	1	2	...	3	...	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...
20. Purulent infection and septicæmia..		29	21	2	3	...	3	18	14	1	2	...	1	1	1	...	...	...	10	6	1	1	...	2
24. Tetanus		3	2	...	...	...	1	2	2	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1
Total Deaths from Tuberculosis		172	65	43	35	18	11	90	34	22	20	10	4	19	10	2	5	...	2	63	21	19	10	8	5
28. Tuberculosis of the lungs		31	10	7	6	5	3	15	6	5	1	2	1	3	...	2	...	1	13	4	2	3	3	1	
29. Acute miliary tuberculosis		21	12	4	1	2	2	10	8	...	1	...	1	2	2	...	...	...	9	2	4	...	2	1
30. Tuberculous meningitis		103	35	29	24	9	6	56	17	17	14	6	2	12	6	2	3	...	1	35	12	10	7	3	3
31. Abdominal tuberculosis		8	6	1	1	...	...	3	2	...	1	...	...	2	2	...	...	...	3	2	1	...	...	...
32. Pott's disease		1	...	...	1	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
33. White swelling		2	...	1	1	...	...	1	...	...	1	...	...	...	...	...	...	...	1	...	1	...	...	...
34. Tuberculosis of other organs ..		4	1	1	1	1	...	2	...	...	1	1	...	...	...	...	...	...	2	1	1	...	...	...
35. Disseminated tuberculosis		2	1	...	...	1	...	2	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
36. Rickets		34	23	7	3	1	...	15	12	2	1	...	...	1	1	...	...	...	18	10	5	2	1	...
37. Syphilis		39	38	1	...	...	...	37	36	1	...	...	...	1	1	...	...	...	1	1	...	...	...	...
38. Gonococcus infection		1	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40. Cancer and other malignant tu- mors of the stomach, liver ..		1	...	...	1	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
41. Cancer and other malignant tumors of the peritonæum, intestines, rectum		1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...
44. Cancer and other malignant tumors of the skin		1	...	...	...	1	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
45. Cancer and other malignant tu- mors of other organs and of organs not specified		5	2	2	1	...	...	4	2	1	1	...	...	...	...	...	...	...	1	...	1	...	...	...
46. Other tumors (tumors of the female genital organs excepted ..		1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1
47. Acute articular rheumatism		10	2	2	2	2	2	4	...	1	2	...	1	3	1	...	1	1	3	1	1	...	1	...	
49. Scurvy		5	5	...	...	...	...	3	3	...	...	...	...	...	...	...	...	...	2	2	...	...	...	...
50. Diabetes		7	2	1	2	1	1	2	...	...	1	...	1	1	1	...	...	...	4	1	1	1	1	...
52. Addison's disease		1	...	1	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
53. Leucæmia		1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...
54. Anæmia, chlorosis		28	11	12	2	2	1	17	10	3	2	2	...	3	1	2	...	...	8	...	7	...	...	1
55. Other general diseases		25	12	6	2	4	1	21	11	5	2	2	1	1	1	...	...	...	3	...	1	...	2	...
59. Other chronic poisonings		1	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
II.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.																									
Group Total		829	559	143	59	33	35	346	244	58	23	8	13	80	51	19	5	4	1	404	264	66	31	21	21
60. Encephalitis		15	8	4	2	...	1	9	4	4	1	...	...	...	...	...	...	...	6	4	...	1	...	1
61. Simple meningitis		233	130	50	26	15	12	92	54	22	8	5	3	29	14	9	3	2	1	112	62	19	15	8	8
62. Locomotor ataxia		2	1	...	1	...	...	1	1	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...
63. Other diseases of the spinal cord		26	7	5	4	4	6	6	...	1	2	1	2	1	...	1	...	...	19	7	4	1	3	4
64. Cerebral hæmorrhage, apoplexy.		7	5	2	...	...	...	7	5	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...
66. Paralysis without specified cause		5	4	1	...	...	...	5	4	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
68. Other forms of mental alienatio		1	...	...	1	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
69. Epilepsy		8	6	...	...	1	1	2	1	...	...	...	1	1	1	...	...	...	5	4	...	...	1	...
71. Convulsions of infants		492	378	74	21	10	9	196	158	27	8	...	3	48	35	10	1	2	...	248	185	37	12	8	6
72. Chorea		1	...	...	1	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
73. Neuralgia and neuritis		1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
74. Other diseases of the nervous system		21	7	4	3	3	4	12	5	...	2	2	3	1	1	...	...	...	8	1	4	1	1	1
75. Diseases of the eyes and their adnexa		1	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	1	...	...	...
76. Diseases of the ears		16	13	2	...	...	1	14	12	1	...	...	1	...	...	...	...	...	2	1	1	...	...	...

TABLE No. 13.—Continued.

Infant Mortality—Deaths Under 5 Years of Age, and Causes, 1916.

OFFICIAL ENGLISH TRANSLATION. (DISEASES AND CAUSES OF DEATH.)	Entire Province.					Cities.					Towns.					Rural Municipalities.								
	Total.	Under 1 Yr.	1 Year.	2 Years.	3 Years.	4 Years.	Total.	Under 1 Yr.	1 Year.	2 Years.	3 Years.	4 Years.	Total.	Under 1 Yr.	1 Year.	2 Years.	3 Years.	4 Years.	Total.	Under 1 Yr.	1 Year.	2 Years.	3 Years.	4 Years.
III.—DISEASES OF THE CIRCULATORY SYSTEM.																								
Group total	39	10	7	7	8	7	24	8	4	1	5	6	2	...	1	1	...	...	13	2	2	5	3	1
77. Pericarditis	1	...	...	...	1	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
78. Acute endocarditis	21	2	4	6	3	6	12	1	3	1	2	5	2	...	1	1	...	...	3	1	...	4	1	1
79. Organic diseases of the heart.	8	2	...	1	4	1	5	2	...	...	2	1	...	...	...	...	...	...	3	...	...	1	2	...
82. Embolism and thrombosis	2	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	...	...	...
83. Diseases of the veins (varices, hæmorrhoids, phlebitis, etc.)	4	4	...	...	...	...	4	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
84. Diseases of the lymphatic system (lymphangitis, etc.) ..	1	...	1	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
85. Hæmorrhage; other diseases of the circulatory system ..	2	1	1	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...
IV.—DISEASES OF THE RESPIRATORY SYSTEM.																								
Group total	1694	1038	416	135	65	40	790	493	197	58	27	15	147	88	41	9	7	2	757	457	178	68	31	23
87. Diseases of the larynx	28	10	8	4	2	4	14	5	5	2	...	2	2	1	...	1	...	...	12	4	3	1	2	2
88. Diseases of the thyroid body.	1	1	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...
89. Acute bronchitis	194	139	41	7	7	...	84	64	16	2	2	...	19	14	5	...	...	...	91	61	20	5	5	...
90. Chronic bronchitis	3	1	...	1	1	...	1	1	...	...	...	...	1	...	...	1	...	...	1	...	...	...	1	...
91. Broncho-pneumonia	613	368	163	54	19	9	323	194	91	27	8	3	61	35	17	5	4	...	229	139	55	22	7	6
92. Pneumonia	809	493	195	64	33	24	343	215	82	23	15	8	62	36	19	2	3	2	404	242	94	39	15	14
93. Pleurisy	17	5	2	5	3	2	14	5	1	4	2	2	...	...	...	...	...	...	3	...	1	1	1	...
94. Pulmonary congestion, pulmonary apoplexy	27	20	6	...	...	1	11	9	2	...	...	...	1	1	...	...	...	...	15	10	4	...	...	1
96. Asthma	2	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	...	...	...
V.—DISEASES OF THE DIGESTIVE SYSTEM.																								
Group total	1537	1186	227	67	40	17	823	660	116	30	13	4	141	110	20	6	4	1	573	416	91	31	23	12
99. Diseases of the mouth and adnexa	10	9	1	...	...	...	7	6	1	...	...	...	1	1	...	...	...	...	2	2	...	...	...	...
100. Diseases of the pharynx	11	1	1	2	6	1	5	...	1	2	2	...	3	1	...	...	1	1	3	...	...	...	3	...
101. Diseases of the œsophagus ..	1	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103. Other diseases of the stomach (cancer excepted)	102	70	23	5	3	1	46	31	11	1	2	1	3	2	...	1	...	...	53	37	12	3	1	...
104. Diarrhœa and enteritis (under 2 years)	1214	1026	188	...	...	...	684	585	99	...	...	...	117	99	18	...	...	...	413	342	71	...	...	...
105. Diarrhœa and enteritis (2 years and over	70	...	...	43	25	2	27	...	20	7	...	...	6	...	...	3	3	...	37	...	...	20	15	2
108. Appendicitis and typhlitis ...	11	...	2	3	4	2	5	...	1	2	2	...	1	...	1	...	...	...	5	...	...	1	2	2
109. Hernia, intestinal obstructions	43	35	4	1	...	3	20	17	2	...	1	3	3	...	...	...	...	...	20	15	2	1	...	2
110. Diseases of the intestines	30	19	3	5	...	3	10	6	1	2	...	1	4	3	...	...	...	...	16	10	2	2	...	2
115. Other diseases of the liver ...	16	12	2	2	...	...	10	9	...	1	...	...	2	1	1	...	...	...	4	2	1	1	...	...
117. Simple peritonitis (non-puerperal)	29	13	3	6	2	5	8	5	...	2	...	1	1	...	...	1	...	...	20	8	3	3	2	4
VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.																								
Group total	83	58	11	4	7	3	43	31	7	1	3	1	4	3	1	...	...	...	36	24	3	3	4	2
119. Acute nephritis	73	52	9	3	6	3	38	28	5	1	3	1	4	3	1	...	...	...	31	21	3	2	3	2
121. Chyluria	2	...	2	...	...	...	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
122. Other diseases of the kidneys and adnexa	7	5	...	1	1	...	2	2	...	...	...	...	...	...	...	...	...	...	5	3	...	1	1	...
127. Non-veneræal diseases of the male genital organs	1	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.																								
Group total	26	20	2	3	...	1	15	10	2	2	...	1	2	2	...	...	...	...	9	8	...	1	...	...
142. Gangrene	3	2	...	...	...	1	2	1	...	...	...	...	1	1	1	...	...	...	...	...	...	...	...	...
143. Furuncle	1	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
144. Acute abscess	17	12	2	3	...	...	10	6	2	2	...	...	...	...	...	...	...	...	7	6	...	1	...	...
145. Other diseases of the skin and adnexa	5	5	...	...	...	...	2	2	...	...	...	...	1	1	...	...	...	...	2	2	...	...	...	...

TABLE No. 13.—Concluded.

Infant Mortality—Deaths Under 5 Years of Age, and Causes, 1916.

OFFICIAL ENGLISH TRANSLATION. (DISEASES AND CAUSES OF DEATH.)	Entire Province.					Cities.					Towns.					Rural Municipalities.								
	Total.	Under 1 Yr.	1 Year.	2 Years.	3 Years.	4 Years.	Total.	Under 1 Yr.	1 Year.	2 Years.	3 Years.	4 Years.	Total.	Under 1 Yr.	1 Year.	2 Years.	3 Years.	4 Years.	Total.	Under 1 Yr.	1 Year.	2 Years.	3 Years.	4 Years.
IX.—DISEASES OF THE BONES AND OF THE ORGANS OF LOCOMOTION.																								
Group total	6	4	1	...	...	1	4	3	...	...	...	1	...	...	...	...	...	2	1	1	...	...	...	...
146. Diseases of the bones (tuberculosis excepted)	6	4	1	...	...	1	4	3	...	...	...	1	...	...	...	...	...	2	1	1	...	...	...	...
X.—CONGENITAL MALFORMATIONS.																								
150. Congenital malformations (stillbirths not included). Total	236	236	...	...	...	...	121	121	...	...	...	...	16	16	...	...	...	99	99	...	...	...	...	...
XI.—DISEASES OF EARLY INFANCY.																								
Group total	3238	3238	...	...	...	...	1388	1388	...	...	...	...	272	272	...	...	...	1578	1578	...	...	...	...	...
151. Congenital debility, icterus, and sclerema	3104	3104	...	...	...	...	1280	1280	...	...	...	...	270	270	...	...	...	1554	1554	...	...	...	...	...
152. Other diseases peculiar to early infancy	98	98	...	...	...	...	96	96	...	...	...	...	...	...	...	...	...	2	2	...	...	...	...	...
153. Lack of care	36	36	...	...	...	...	12	12	...	...	...	...	2	2	...	...	...	22	22	...	...	...	...	...
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																								
Group total	217	50	44	51	41	31	86	18	12	27	13	16	23	9	4	1	6	3	108	23	28	23	22	12
164. Poisoning by food	5	...	1	3	1	...	2	...	2	...	...	...	...	...	...	...	...	3	...	1	1	1	...	...
165. Other acute poisonings	26	7	9	8	1	1	7	2	1	4	...	...	5	2	3	...	...	14	3	5	4	1	1	...
166. Conflagration	4	1	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	4	1	...	1	2	...	...
167. Burns (conflagration excepted)	66	6	13	18	15	14	38	2	7	13	7	9	2	...	...	2	...	26	4	6	5	6	5	...
168. Absorption of deleterious gases (conflagration excepted)...	13	9	2	1	...	1	7	6	1	...	...	...	...	...	...	...	...	6	3	1	1	...	1	...
169. Accidental drowning	30	2	7	8	9	4	4	...	...	1	2	1	5	1	1	1	1	21	1	6	6	6	2	...
170. Traumatism by firearms	3	...	...	...	2	1	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	2	1	...
171. Traumatism by cutting or piercing instruments	1	...	...	1	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
172. Traumatism by fall	9	2	4	...	2	1	3	...	1	...	2	...	1	1	...	...	...	5	1	3	...	...	1	...
173. Traumatism in mines and quarries	2	...	...	...	1	1	1	...	...	...	...	1	1	...	...	1	...	...	...	...	...	...	...	...
175. Traumatism by other crushing	10	...	2	4	2	2	7	...	...	3	2	2	...	...	...	...	...	3	...	2	1	...	...	...
176. Injuries by animals	2	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	2	...	1	...	1	...	...
179. Effects of heat	13	12	1	...	...	...	7	6	1	...	...	...	3	3	...	...	...	3	3	...	...	...	...	...
184. Homicide by other means....	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...
185. Fractures (cause not specified)	11	3	1	3	...	4	5	...	1	1	...	3	...	...	...	...	...	6	3	...	2	...	1	...
186. Other external violence	21	8	2	4	5	2	4	2	...	2	...	...	6	2	...	2	2	11	4	2	2	3	...	...
XIV.—ILL-DEFINED DISEASES.																								
Group total	94	10	53	17	6	8	34	5	21	5	2	1	6	3	1	2	...	54	2	31	10	4	7	...
187. Ill-defined organic disease ...	4	3	...	...	1	...	1	1	...	...	...	...	2	2	...	...	...	1	...	...	...	1	...	...
188. Sudden death	5	2	2	...	1	...	3	2	...	1	...	...	...	...	...	...	...	2	...	2	...	...	...	...
189. Cause of death not specified or ill-defined	85	5	51	17	4	8	30	2	21	5	1	1	4	1	1	2	...	51	2	29	10	3	7	...
STILL-BIRTHS.																								
Not included in totals	2698	...	...	...	...	...	1332	...	...	...	...	...	232	...	...	...	...	1134	...	...	...	...	...	...



APPENDIX

BIRTHS BY MONTHS AND SEX IN ONTARIO (INCLUDING CITIES AND TOWNS), 1916.

Counties.	Sex.	Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	No. pairs of twins.	No. cases of triplets.	Illegiti- mates.	Still- Births.
Grand Total, Province.		65,264	5,373	5,242	5,978	5,657	5,658	5,301	5,726	5,767	5,452	5,000	4,918	5,192	704	11	1,365	2,055
Total Counties, Cities, Towns	M	33,663	2,801	2,701	3,116	2,913	2,942	2,669	2,949	2,966	2,784	2,587	2,558	2,677	726	16	672	1,139
Total Counties, Cities, Towns	F	31,601	2,572	2,541	2,862	2,744	2,716	2,632	2,777	2,801	2,668	2,413	2,360	2,515	682	17	693	916
Total Counties only		33,639	2,758	2,654	3,070	3,020	3,061	2,704	2,910	3,008	2,889	2,510	2,423	2,632	346	5	430	993
Total	M	17,297	1,434	1,361	1,560	1,542	1,609	1,372	1,502	1,553	1,447	1,282	1,262	1,373	352	8	211	561
Total	F	16,342	1,324	1,293	1,510	1,478	1,452	1,332	1,408	1,455	1,442	1,228	1,161	1,259	340	7	219	432
Algoma.....	M	271	23	25	27	28	30	13	23	19	32	16	12	23	4	.....	2	5
	F	220	13	19	18	27	26	18	15	21	16	12	19	16	8	.....	2	3
		491	36	44	45	55	56	31	38	40	48	28	31	39	6	.....	4	8
Brant.....	M	281	27	21	22	26	27	24	18	29	15	29	15	28	9	.....	12	10
	F	216	18	13	15	18	16	19	17	25	18	15	22	20	5	.....	7	11
		497	45	34	37	44	43	43	35	54	33	44	37	48	7	.....	19	21
Bruce	M	507	34	40	41	48	56	39	53	43	41	31	47	34	11	.....	14	14
	F	460	36	42	39	28	48	43	28	45	36	48	33	34	11	.....	5	14
		967	70	82	80	76	104	82	81	88	77	79	80	68	11	.....	19	28
Carleton.....	M	367	31	36	35	29	23	31	31	39	34	27	24	27	1	.....	2	19
	F	361	23	31	37	24	36	34	37	24	31	33	22	29	3	.....	2	16
		728	54	67	72	53	59	65	68	63	65	60	46	56	2	.....	4	35

BIRTHS BY MONTHS AND SEX IN ONTARIO, 1916.—Continued.

Counties.	Sex.	Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	No. pairs of twins.	No. cases of triplets.	Illegiti- mates.	Still- Births.
Hastings.....	M	488	31	37	44	40	42	42	39	37	53	41	36	46	6	.....	6	15
	F	440	26	36	55	51	45	35	36	33	44	22	24	33	14	.....	9	10
Huron	M	928	57	73	99	91	87	77	75	70	97	63	60	79	10	.....	15	25
	F	456	44	35	48	39	34	39	45	37	39	36	36	24	6	.....	5	14
Kenora	M	455	45	37	41	35	54	38	43	32	38	24	40	28	16	.....	8	14
	F	911	89	72	89	74	88	77	88	69	77	60	76	52	11	.....	13	28
Kent	M	78	5	4	5	7	7	7	6	9	10	7	4	7	.....	.....	.....	2
	F	69	6	8	3	4	3	9	1	8	4	8	11	4	2	.....	2	2
Kent	M	147	11	12	8	11	10	16	7	17	14	15	15	11	1	.....	2	4
	F	496	44	37	40	38	38	30	54	47	54	41	33	40	15	.....	6	12
Lambton.....	M	489	38	32	53	44	36	46	32	35	58	41	38	36	13	.....	8	14
	F	985	82	69	93	82	74	76	86	82	112	82	71	76	14	.....	14	26
Lambton.....	M	395	34	25	41	36	34	29	43	44	22	28	30	29	8	.....	3	16
	F	396	35	32	41	32	37	20	36	28	46	36	28	25	4	.....	4	11
Lanark.....	M	791	69	57	82	68	71	49	79	72	68	64	58	54	6	.....	7	27
	F	234	18	29	23	21	23	12	23	22	13	16	20	14	5	.....	5	12
Lanark.....	M	232	18	24	19	17	23	13	22	22	20	18	24	12	5	.....	2	6
	F	466	36	53	42	38	46	25	45	44	33	34	44	26	5	.....	7	18
Leeds and Grenville	M	355	25	20	40	38	45	22	34	25	21	29	28	28	19	.....	10	10
	F	389	32	22	38	25	33	30	34	49	42	22	37	25	5	.....	3	8
		744	57	42	78	63	78	52	68	74	63	51	65	53	12	.....	13	18

BIRTHS BY MONTHS AND SEX IN ONTARIO, 1916—Continued.

Counties.	Sex.	Total.	January.												No. pairs of twins.	No. cases of triplets.	Illegiti- mates.	Still- Births.
			January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.				
Ontario.....	M	360	30	28	34	32	32	33	26	31	33	38	23	20	5	.....	5	15
	F	318	27	26	21	30	32	21	33	22	26	26	24	30	3	.....	9	8
Oxford	M	678	57	54	55	62	64	54	59	53	59	64	47	50	4	.....	14	23
	F	348	36	32	24	33	32	31	33	25	32	21	25	24	10	.....	5	10
Parry Sound.....	M	325	27	31	38	24	17	31	36	25	17	31	21	27	4	.....	3	9
	F	673	63	63	62	57	49	62	69	50	49	52	46	51	7	.....	8	19
Peel.....	M	302	28	27	27	24	33	27	19	28	31	22	21	15	8	.....	5	10
	F	322	22	31	40	33	30	31	23	25	35	16	23	13	10	.....	4	3
Peel.....	M	624	50	58	67	57	63	58	42	53	66	38	44	28	9	.....	9	13
	F	225	17	21	30	17	22	18	14	16	16	22	15	17	9	1	3	10
Perth	M	239	17	21	17	24	16	20	19	20	27	24	18	16	11	2	2	3
	F	464	34	42	47	41	38	38	33	36	43	46	33	33	10	1	5	13
Perth	M	372	30	34	27	35	45	30	36	26	27	24	27	31	9	.....	1	9
	F	316	20	14	24	23	34	30	28	40	27	24	19	33	1	.....	2	6
Peterborough.....	M	688	50	48	51	58	79	60	64	66	54	48	46	64	5	.....	3	15
	F	260	18	18	22	28	32	15	25	26	24	23	7	22	.....	.....	4	14
Prescott and Russell.....	M	213	21	25	14	22	11	16	21	17	25	13	14	14	2	.....	4	8
	F	473	39	43	36	50	42	31	46	43	49	36	21	36	1	.....	8	22
Prescott and Russell.....	M	903	77	61	91	90	93	85	67	86	64	54	64	77	19	.....	3	10
	F	789	68	68	77	74	65	64	77	65	62	55	59	55	11	.....	2	6
		1,692	145	129	168	164	158	149	144	145	126	109	123	132	15	.....	5	16

Prince Edward.....	M	171	19	15	13	8	16	17	12	11	11	18	13	18	7	.....	3
	F	153	15	11	10	17	17	23	9	12	9	3	13	14	1	.....	6
		324	34	26	23	25	33	40	21	23	20	21	26	32	4	.....	8
Rainy River.....	M	175	13	18	14	27	10	12	14	16	15	12	13	11	1	.....	6
	F	136	12	14	16	14	7	12	13	10	8	9	13	8	1	.....	3
		311	25	32	30	41	17	24	27	26	23	21	26	19	1	.....	9
Renfrew.....	M	507	50	31	44	33	48	36	44	35	37	35	48	66	18	.....	4
	F	532	43	35	49	50	46	50	40	42	42	45	39	51	18	.....	6
		1,039	93	66	93	83	94	86	84	77	79	80	87	117	18	.....	10
Simcoe	M	577	50	36	50	40	41	48	64	69	45	50	41	43	17	.....	6
	F	548	50	44	58	42	47	38	52	53	41	42	37	44	15	.....	4
		1,125	100	80	108	82	88	86	116	122	86	92	78	87	16	.....	9
Stormont, Dundas and Glengarry	M	591	40	54	44	61	42	41	56	55	50	50	49	49	19	.....	4
	F	499	46	44	47	47	47	33	39	42	50	29	40	35	15	.....	6
		1,090	86	98	91	108	89	74	95	97	100	79	89	84	17	.....	10
Sudbury.....	M	442	29	39	43	40	37	36	31	35	33	24	46	49	9	3	18
	F	411	37	30	32	42	28	39	23	37	36	30	41	36	5	.....	4
		853	66	69	75	82	65	75	54	72	69	54	87	85	7	1	32
Thunder Bay	M	88	8	8	11	5	5	6	8	6	8	8	10	5	.....	.....	7
	F	74	4	9	6	4	7	10	8	8	9	2	4	3	.....	.....	3
		162	12	17	17	9	12	16	16	14	17	10	14	8	.....	.....	10
Timiskaming	M	564	34	39	50	54	68	50	55	47	41	37	44	45	8	.....	7
	F	540	34	42	43	61	55	49	45	51	44	47	29	40	12	.....	8
		1,104	68	81	93	115	123	99	100	98	85	84	73	85	10	.....	15

BIRTHS BY MONTHS AND SEX IN ONTARIO, 1916—Concluded.

Counties.	Sex.	Total.	January.												No. pairs of twins.	No. cases of triplets.	Illegitimate.	Still-Births.
			January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.				
Victoria.....	M	189	17	9	9	13	16	22	22	28	21	14	9	9	7	.....	2	10
	F	186	17	9	17	20	15	25	14	14	19	12	12	12	3	.....	3	8
Waterloo.....	M	375	34	18	26	33	31	47	36	42	40	26	21	21	5	.....	5	18
	F	466	35	40	46	49	41	28	41	35	54	30	28	39	5	.....	3	10
Welland.....	M	419	32	38	35	42	46	35	32	34	27	35	31	32	9	.....	4	9
	F	885	67	78	81	91	87	63	73	69	81	65	59	71	7	.....	7	19
Wellington.....	M	404	33	31	39	29	40	21	34	40	30	34	37	36	7	.....	3	12
	F	399	36	30	40	33	35	31	37	39	38	26	22	32	7	.....	6	11
Wentworth.....	M	803	69	61	79	62	75	52	71	79	68	60	59	68	7	.....	9	23
	F	373	35	24	31	27	40	36	33	28	27	37	26	29	9	.....	.....	8
York.....	M	359	23	40	26	24	35	36	29	27	40	29	25	25	9	.....	4	9
	F	732	58	64	57	51	75	72	62	55	67	66	51	54	9	.....	4	17
.....	M	327	25	26	28	31	28	20	26	31	30	27	24	31	2	.....	2	13
	F	370	34	22	29	29	37	15	32	42	32	30	29	39	8	.....	3	8
.....	M	697	59	48	57	60	65	35	58	73	62	57	53	70	5	.....	5	21
	F	1,133	93	93	113	107	110	91	90	93	100	79	64	100	18	.....	14	37
.....	M	1,022	97	68	73	95	89	85	93	90	91	81	78	82	24	.....	14	28
	F	2,155	190	161	186	202	199	176	183	183	191	160	142	182	21	.....	28	65

BIRTHS BY MONTHS, AND SEX—CITIES, 1916.

Cities.	Sex.	Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	No. pairs of twins.	No. cases of triplets.	Illegiti-mates.	Still-Births.
Grand Total.....	....	26,938	2,244	2,217	2,476	2,250	2,209	2,222	2,400	2,346	2,192	2,083	2,130	2,169	302	6	856	868
Total Males.....	....	13,928	1,177	1,141	1,309	1,177	1,139	1,116	1,213	1,217	1,132	1,108	1,094	1,105	322	8	420	471
Total Females .....	....	13,010	1,067	1,076	1,167	1,073	1,070	1,106	1,187	1,129	1,060	975	1,036	1,064	282	10	436	397
Belleville.....	M F	130 125	8 13	6 9	12 9	11 12	13 10	10 8	7 12	11 9	15 11	11 12	17 10	9 10	3 1	..... .....	1 3	8 5
		255	21	15	21	23	23	18	19	20	26	23	27	19	2	.....	4	13
Brantford	M F	368 341	30 30	42 24	35 33	30 18	31 28	27 38	34 31	27 38	30 24	31 27	36 28	15 22	6 6	..... .....	7 3	12 12
		709	60	66	68	48	59	65	65	65	54	58	64	37	6	.....	10	24
Chatham	M F	126 130	12 8	10 7	11 3	10 8	12 14	9 9	8 10	10 21	16 8	10 8	10 13	8 21	..... .....	..... .....	7 4	..... 1
		256	20	17	14	18	26	18	18	31	24	18	23	29	.....	.....	11	1
Fort William.....	M F	396 419	44 35	42 36	33 26	32 32	32 27	25 33	26 44	37 40	37 32	25 29	26 39	37 46	8 8	..... .....	5 5	9 7
		815	79	78	59	64	59	58	70	77	69	54	65	83	8	.....	10	16
Galt	M F	135 144	11 7	10 13	16 8	10 11	11 13	12 13	12 15	10 16	16 14	8 12	8 9	11 13	2 4	..... .....	2 1	2 2
		279	18	23	24	21	24	25	27	26	30	20	17	24	3	.....	3	4

BIRTHS BY MONTHS, AND SEX--CITIES, 1916--Continued.

Cities.	Sex.	Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	No. pairs of twins.	No. cases of triplets.	Illegiti- mates.	Still- Births
Guelph	M	199	14	26	21	14	18	18	13	14	18	13	12	18	6	.....	4	3
	F	163	10	13	16	16	11	12	13	16	13	16	12	15	.....	.....	5	6
		362	24	39	37	30	29	30	26	30	31	29	24	33	3	.....	9	9
Hamilton	M	1,513	120	117	137	122	126	117	145	130	116	127	121	135	36	.....	37	65
	F	1,375	130	119	129	99	112	109	139	116	98	101	111	112	20	.....	26	57
		2,888	250	236	266	221	238	226	284	246	214	228	232	247	28	.....	63	122
Kingston	M	305	26	37	26	30	27	18	21	30	23	25	20	22	.....	.....	15	12
	F	286	24	22	26	18	19	33	21	21	24	23	26	29	2	.....	11	3
		591	50	59	52	48	46	51	42	51	47	48	46	51	1	.....	26	15
Kitchener.....	M	289	20	31	29	23	29	21	24	20	27	21	21	23	7	.....	4	5
	F	280	21	28	25	23	24	34	19	18	26	16	21	25	7	.....	7	10
		569	41	59	54	46	53	55	43	38	53	37	42	48	7	.....	11	15
London	M	663	43	56	73	48	49	49	70	73	55	55	47	45	15	.....	16	10
	F	621	49	57	63	50	62	40	42	61	59	46	40	52	3	.....	26	8
		1,284	92	113	136	98	111	89	112	134	114	101	87	97	9	.....	42	18
Niagara Falls	M	140	13	11	13	13	8	14	11	14	11	5	13	14	5	.....	2	5
	F	135	12	10	11	8	18	11	13	10	14	12	7	9	7	.....	.....	1
		275	25	21	24	21	26	25	24	24	25	17	20	23	6	.....	2	6

[illegible]

BIRTHS BY MONTHS, AND SEX—CITIES, 1916.—Concluded.

Cities.	Sex.	Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	No. pairs of twins.	No. cases of triplets.	Illegiti- mates.	Still- Births.
Toronto	M	6,535	556	487	607	539	521	556	605	585	535	530	516	495	155	2	204	217
	F	5,963	473	464	551	495	474	505	554	521	483	446	501	496	137	4	212	183
		12,498	1,029	951	1,158	1,034	995	1,064	1,159	1,106	1,018	976	1,017	991	146		416	400
Windsor	M	363	28	23	28	30	29	34	28	28	36	32	28	39	1	.....	4	13
	F	351	33	28	31	31	25	26	28	38	26	35	19	31	7	3	4	23
		714	61	51	59	61	54	60	56	66	62	67	47	70	4	1	8	36
Woodstock	M	109	11	11	6	9	14	7	8	15	5	7	9	7	5	.....	3	8
	F	97	13	6	6	12	6	10	8	3	6	16	4	7	3	.....	4	3
		206	24	17	12	21	20	17	16	18	11	23	13	14	4	.....	7	11

BIRTHS BY MONTHS AND SEX—TOWNS, 1916.

Towns.	Sex.	Total.	January.	February.	March.	April.	May.	June.	July.	August.	Septem-ber.	October.	Novem-ber.	Decem-ber.	No. Pairs of Twins.	No. Cases of Triplets.	Illegiti-mates.	Still-Births.
Grand Total.....	...	4,687	371	371	422	387	388	375	416	413	371	407	365	391	56	.....	79	194
Total Males.....	...	2,438	190	199	247	194	194	181	234	196	205	197	202	199	52	.....	41	107
Total Females .....	...	2,249	181	172	185	193	194	194	182	217	166	210	163	192	60	.....	38	87
Barrie.....	M F	85 72	4 2	10 6	4 3	5 9	8 4	2 11	9 3	9 8	7 7	8 5	11 5	8 9	.....	.....	.....	1
Brockville.....	M F	157	6	16	7	14	12	13	12	17	14	13	16	17	.....	.....	2	1
Cobalt.....	M F	121 88	4 12	10 7	6 12	9 11	9 13	13 21	18 10	9 8	7 7	7 11	11 6	9 11	1	.....	4	10
Cobourg.....	M F	209	16	17	18	20	22	34	28	17	14	18	17	20	2	.....	7	18
Collingwood.....	M F	46 45	1 6	3 3	10 3	2 3	7 6	4	4	3 6	9 1	1 6	1 5	1 4	.....	.....	1	3
Cornwall.....	M F	128 100	7 5	10 6	24 8	12 8	8 5	8 13	15 10	8 10	14 9	13 10	6 7	3 9	6	.....	5	2
Ingersoll.....	M F	73 78	8 4	6 9	8 9	6 10	7 10	6 6	4 3	5 4	6 9	2 7	9 6	6 2	3	.....	.....	2
		151	12	15	17	1a	17	12	7	9	15	9	15	8	4	.....	.....	5

BIRTHS BY MONTHS AND SEX—TOWNS, 1916.—Concluded.

Towns.	Sex.	Total.	January.	February.	March.	April.	May.	June.	July.	August.	Septem-ber.	October.	Novem-ber.	Decem-ber.	No. Pairs of Twins.	No. Cases of Triplets.	Illegiti-mates.	Still-Births.
Kenora	M	76	8	5	10	7	2	7	5	6	8	3	6	9	2	2	2	3
	F	69	5	5	5	4	1	4	4	10	4	14	6	7	2	.....	.....	3
		145	13	10	15	11	3	11	9	16	12	17	12	16	2	.....	2	6
Lindsay.....	M	84	7	5	7	3	9	6	11	5	7	5	9	10	.....	.....	1	6
	F	78	4	6	3	6	8	9	10	6	5	9	5	7	2	.....	3	4
		162	11	11	10	9	17	15	21	11	12	14	14	17	1	.....	4	10
Midland	M	112	16	4	8	4	10	10	9	10	9	14	8	10	2	.....	1	8
	F	84	10	8	7	8	8	4	3	12	4	8	4	8	.....	.....	.....	6
		196	26	12	15	12	18	14	12	22	13	2	12	18	1	.....	1	14
North Bay.....	M	194	12	12	20	23	7	17	20	24	14	16	18	11	8	.....	1	7
	F	212	14	20	20	17	18	15	14	20	11	19	21	23	6	.....	4	5
		406	26	32	40	40	25	32	34	44	25	35	39	34	7	.....	5	12
Orillia.....	M	106	6	9	12	7	10	9	10	6	13	7	8	9	1	.....	2	2
	F	86	7	4	3	8	10	5	8	8	9	12	4	8	3	.....	.....	2
		192	13	13	15	15	20	14	18	14	22	19	12	17	2	.....	2	4
Oshawa	M	128	11	6	10	10	11	14	9	13	10	14	8	12	4	.....	1	4
	F	130	10	9	11	10	15	6	10	16	14	15	8	6	2	.....	1	5
		258	21	15	21	20	26	20	19	29	24	29	16	18	3	.....	2	9
Owen Sound.....	M	173	16	14	14	12	12	8	15	9	19	13	20	21	4	.....	3	5
	F	171	12	6	12	19	9	20	19	21	16	14	12	11	10	.....	5	9
		344	28	20	26	31	21	28	34	30	35	27	32	32	7	.....	8	14

M F	Parry Sound.....	93	2	10	7	4	8	9	10	11	11	6	12	3	4	.....	2	4
		92	11	6	6	5	8	8	10	9	5	12	7	5	.....	.....	2	2
M F	Pembroke.....	185	13	16	13	9	16	17	20	20	16	18	19	8	2	.....	4	6
		114	6	9	9	10	12	9	12	10	10	8	8	11	1	.....	.....	5
		84	5	7	7	5	7	5	11	6	12	5	4	10	3	.....	1	2
M F	Port Hope.....	198	11	16	16	15	19	14	23	16	22	13	12	21	2	.....	1	7
		47	4	1	8	6	4	2	5	3	4	4	3	3	.....	.....	3	....
		40	3	1	2	3	7	5	4	5	2	3	1	4	2	.....	1	4
M F	Smith's Falls.....	87	7	2	10	9	11	7	9	8	6	7	4	7	1	.....	4	4
		88	8	13	6	6	5	6	10	6	6	9	7	6	2	.....	2	3
		88	9	10	10	2	5	6	12	4	4	12	5	9	4	.....	.....	....
M F	Steelton.....	176	17	23	16	8	10	12	22	10	10	21	12	15	3	.....	2	3
		80	2	7	10	6	4	6	8	9	4	7	8	9	.....	.....	3	7
		64	8	6	8	3	3	6	8	6	4	4	5	3	.....	.....	1	2
M F	Sudbury.....	144	10	13	18	9	7	12	16	15	8	11	13	12	.....	.....	4	9
		225	26	21	26	17	22	13	17	16	16	24	9	18	5	.....	7	20
		229	19	25	15	21	21	24	10	25	15	19	17	18	7	.....	3	16
M F	Trenton.....	454	45	46	41	38	43	37	27	41	31	43	26	36	6	.....	10	36
		65	7	5	6	6	5	6	6	6	4	5	7	2	.....	.....	.....	2
		63	5	5	11	3	3	8	5	6	3	2	5	7	.....	.....	3	....
M F	Walkerville.....	128	12	10	17	9	8	14	11	12	7	7	12	9	.....	.....	3	2
		70	7	8	6	4	8	3	6	3	3	4	9	9	.....	.....	.....	5
		49	4	1	4	5	10	4	4	1	1	6	5	4	.....	.....	.....	3
M F	Welland.....	119	11	9	10	9	18	7	10	4	4	10	14	13	.....	.....	.....	8
		131	13	16	18	14	7	8	7	11	9	9	8	11	4	.....	1	5
		131	12	10	11	14	8	7	13	17	10	3	11	15	2	.....	.....	1
M F		262	25	26	29	28	15	15	20	28	19	12	19	26	3	.....	1	6

MARRIAGES BY MONTHS—COUNTIES, 1916.

Counties.	Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Grand Total	23,401	1,979	1,868	1,980	1,980	1,700	2,734	1,636	1,531	2,330	1,900	1,833	1,930
(all Municipalities)													
Total Counties (excluding Cities and Towns)	9,775	824	797	915	754	677	1,273	600	595	938	781	772	849
Algoma	176	9	13	13	14	10	15	19	23	23	7	19	11
Brant	137	11	16	12	16	7	21	6	7	14	8	12	7
Bruce	340	32	27	37	22	20	43	26	19	30	25	26	33
Carleton	170	9	6	13	16	16	27	12	12	18	11	20	10
Dufferin	113	10	13	13	10	5	20	5	6	10	4	7	10
Elgin	185	17	18	12	19	10	17	11	11	14	16	17	23
Essex	371	34	22	19	20	31	57	25	16	39	34	34	40
Frontenac	101	11	11	9	4	7	11	2	6	13	10	7	10
Grey	343	20	32	40	31	15	56	19	17	29	29	18	37
Haldimand	164	10	14	13	15	13	23	12	6	20	18	7	13
Haliburton	26	3	1	1	3	2	2	4	.....	2	3	1	4
Halton	137	15	13	10	15	4	18	9	6	12	13	6	10
Hastings	276	39	27	26	25	22	17	13	9	25	20	16	37
Huron	375	32	30	41	35	21	49	21	17	33	33	30	33
Kenora	34	2	2	3	2	1	5	4	4	5	2	1	3
Kent	271	29	17	22	19	19	23	17	13	27	21	32	32
Lambton	270	27	20	22	27	23	41	14	9	24	15	25	23
Lanark	214	16	13	14	15	15	30	10	10	16	17	25	33
Leeds and Grenville	292	18	29	25	21	14	40	12	19	36	25	23	30
Lennox and Addington	130	5	7	10	13	8	17	3	10	17	13	14	13
Lincoln	163	7	14	16	10	18	21	9	10	22	14	12	10
Manitoulin	76	2	7	10	4	5	8	10	4	5	3	9	9
Middlesex	265	29	29	21	20	11	45	12	9	27	16	22	24
Muskoka	142	6	7	10	17	13	20	12	8	22	13	7	7
Nipissing	181	23	10	14	7	15	8	20	18	19	20	13	14
Norfolk	225	17	27	29	27	20	25	10	10	20	18	15	
Northumberland and Durham	307	38	22	38	20	17	36	8	20	25	27	30	2
Ontario	243	18	27	31	27	9	27	11	19	11	17	19	27
Oxford	195	12	14	14	20	14	33	6	13	14	18	11	26
Parry Sound	116	8	3	15	12	11	12	9	4	12	9	11	10
Peel	134	12	9	18	8	11	21	6	9	12	9	10	9
Perth	244	27	20	28	24	17	29	15	8	20	15	23	18
Peterborough	120	14	11	10	11	12	13	4	3	6	13	10	13
Prescott and Russell	349	40	30	20	10	35	45	27	39	56	26	16	5
Prince Edward	111	13	9	14	5	7	12	6	5	10	3	6	21
Rainy River	74	3	6	6	5	7	9	12	6	5	3	10	2
Renfrew	302	30	28	20	15	20	51	20	20	24	27	34	13
Simcoe	306	16	26	35	24	17	48	27	18	23	24	23	25
Stormont, Dundas & Glengarry	364	36	35	27	17	29	46	21	25	44	39	20	25
Sudbury	96	4	8	8	2	8	16	9	8	12	8	9	4
Thunder Bay	20	1	1	3	.....	4	4	1	2	.....	1	2	1
Timiskaming	198	10	10	15	6	28	29	16	16	18	17	14	19
Victoria	98	6	9	8	12	6	15	7	6	8	4	7	10
Waterloo	272	15	17	38	17	17	39	14	18	22	22	23	30
Welland	260	23	23	14	22	17	40	13	25	27	26	16	14
Wellington	241	18	20	29	21	13	27	14	13	20	18	23	25
Wentworth	150	10	10	17	11	11	21	11	13	12	14	9	11
York	398	37	28	52	33	22	41	26	26	35	33	28	32

MARRIAGES BY MONTHS IN THE CITIES OF ONTARIO, 1916.

Cities.	Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Total.....	11,799	1,004	935	941	1,066	898	1,256	886	802	1,184	960	930	937
Belleville.....	136	12	11	10	15	7	13	16	8	11	3	14	11
Brantford.....	289	20	18	24	36	23	38	18	21	22	17	23	29
Chatham.....	192	15	15	11	13	14	27	16	8	18	19	18	18
Fort William.....	202	25	12	14	12	22	19	9	18	35	10	18	8
Galt.....	116	5	7	11	11	4	20	4	11	11	13	6	13
Guelph.....	152	14	12	10	12	21	11	9	12	13	16	9	13
Hamilton.....	1,147	98	91	80	120	76	163	78	68	118	96	66	93
Kingston.....	264	25	26	9	23	14	32	32	19	30	17	19	18
Kitchener.....	184	13	19	15	14	16	15	8	15	18	20	14	17
London.....	631	59	55	42	59	42	84	58	45	52	46	49	40
Niagara Falls.....	294	17	19	12	15	26	32	29	22	36	35	29	22
Ottawa.....	1,057	64	77	88	78	85	126	88	74	113	117	80	67
Peterborough.....	215	16	10	20	22	17	21	15	17	22	17	19	19
Port Arthur.....	142	7	7	9	11	14	17	13	15	15	9	11	14
St. Catharines.....	250	16	14	12	22	20	40	19	20	25	16	27	19
St. Thomas.....	161	7	8	14	15	23	24	9	13	20	9	8	11
Sarnia.....	165	12	10	17	9	14	15	11	13	22	14	14	14
Sault Ste. Marie.....	133	6	10	8	10	10	20	16	4	9	9	13	18
Stratford.....	162	15	14	12	17	8	34	10	12	14	11	6	19
Toronto.....	5,158	486	445	469	509	387	402	370	332	494	417	423	424
Windsor.....	614	56	45	43	35	47	80	53	44	74	40	56	41
Woodstock.....	135	16	10	11	18	8	18	5	11	12	9	8	9

MARRIAGES BY MONTHS IN THE TOWNS OF ONTARIO, 1916.

Towns.	Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Total.....	1,827	151	136	124	160	125	205	150	134	208	159	131	144
Barrie.....	99	9	8	10	13	8	6	6	9	8	7	7	8
Brockville.....	119	6	11	10	5	10	18	9	8	14	10	8	10
Cobalt.....	70	3	5	5	5	5	12	6	5	9	4	7	4
Cobourg.....	61	1	7	5	5	8	4	7	4	9	3	3	5
Collingwood.....	87	8	8	5	11	6	15	6	2	9	6	5	6
Cornwall.....	111	13	12	6	8	10	9	7	7	9	13	14	3
Ingersoll.....	58	7	4	6	5	4	7	4	5	4	5	2	5
Kenora.....	50	8	3	1	3	2	2	5	7	4	4	5	6
Lindsay.....	103	7	7	7	12	6	6	13	9	10	9	6	11
Midland.....	43	1	3	6	2	4	7	5	4	2	5	2	2
North Bay.....	103	14	11	1	12	8	19	8	7	7	9	4	3
Orillia.....	90	5	4	5	9	8	12	6	4	15	10	5	7
Oshawa.....	86	10	3	8	9	6	4	7	5	9	9	8	8
Owen Sound.....	139	13	12	12	18	6	9	12	11	15	14	6	11
Parry Sound.....	74	5	2	3	3	4	4	6	11	12	7	5	12
Pembroke.....	75	7	2	4	2	5	10	7	6	13	5	7	7
Port Hope.....	61	6	6	1	5	.....	13	4	3	8	2	5	3
Smith's Falls.....	48	1	2	3	5	3	10	2	5	2	7	5	3
Steelton.....	37	4	2	1	4	3	3	3	2	5	5	2	2
Sudbury.....	107	8	.....	11	7	9	7	12	7	15	10	6	8
Trenton.....	62	7	5	2	3	5	9	4	3	5	4	8	7
Walkerville.....	50	4	5	4	9	.....	5	2	6	7	5	1	2
Welland.....	94	4	7	8	5	5	14	9	4	17	6	7	8

Marriages by Denominations in the Province of Ontario, 1916.

(Including Cities and Towns).

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican.....	2,962	746	708	176	167	35	20	2	1	6	36	.....	4,859
Presbyterian	637	2,960	780	93	173	26	40	7	1	3	41	3	4,764
Methodist.....	667	896	3,987	93	274	32	49	8	3	5	54	4	6,072
Roman Catholic.....	202	144	130	3,443	24	7	19	2	1	.....	56	2	4,030
Baptist	191	242	303	42	625	14	15	6	.....	2	20	3	1,463
Congregationalist.....	30	28	19	1	12	68	3	1	.....	2	1	.....	165
Lutheran..	36	35	46	19	15	4	417	9	2	.....	9	.....	592
Evangelical Association	4	8	9	.....	5	.....	9	60	.....	.....	2	.....	97
Hebrew	1	.....	.....	3	1	.....	.....	.....	414	.....	.....	.....	419
Salvation Army.....	4	8	19	3	1	.....	2	.....	.....	78	1	.....	116
Others Denominations.	34	47	54	34	13	3	13	6	.....	.....	601	.....	805
Denomination notstat'd	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	18	19
TOTAL GROOMS	4,768	5,114	6,056	3,907	1,310	189	587	101	422	96	321	30	23,401

Licenses, 20,411.

Banns, 2,990.

Marriages by Ages in the Province of Ontario, 1916.

(Including Cities and Towns).

GROOMS.

BRIDES	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	406	2,901	1,107	223	64	16	10	4	1	1	.....	1	.....	4,734
	20	126	4,710	3,525	1,010	273	101	23	6	4	3	1	.....	.....	9,782
	25	8	700	2,370	1,219	486	142	48	18	8	2	.....	.....	.....	5,001
	30	.....	65	422	643	398	197	80	27	17	4	1	.....	.....	1,854
	35	.....	13	65	193	274	160	100	45	25	8	3	2	.....	888
	40	.....	6	8	39	92	131	92	72	40	15	7	3	.....	505
	45	.....	1	2	7	12	51	73	60	44	22	16	2	.....	290
	50	.....	.....	.....	1	1	8	15	48	30	24	15	5	.....	147
	55	.....	.....	.....	.....	2	5	2	11	21	26	13	10	3	93
	60	.....	.....	.....	.....	.....	1	2	6	5	19	19	14	.....	66
	65	.....	.....	.....	.....	.....	.....	.....	.....	3	5	11	8	1	28
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13	.....	13
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		540	8,396	7,499	3,335	1,602	812	445	297	198	129	86	58	4	23,401

Marriages by Denominations in the Counties of Ontario, 1916.

(Excluding Cities and Towns).

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Others Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican		788	251	272	35	43	6	9	1	1	.....	10	.....	1,416
Presbyterian.....		249	1,331	406	27	65	12	22	7	.....	.....	22	.....	2,141
Methodist		280	483	2,167	18	123	10	26	5	.....	1	29	.....	3,142
Roman Catholic		40	36	34	1,611	5	1	5	1	.....	.....	10	.....	1,743
Baptist		56	86	130	8	242	2	1	5	.....	1	10	2	543
Congregationalist		5	10	5	.....	1	13	2	.....	.....	.....	.....	.....	36
Lutheran.....		17	15	25	5	4	1	233	8	1	.....	4	.....	313
Evangelical Association..		1	7	7	.....	5	.....	9	44	.....	.....	2	.....	75
Hebrew	1	.....	.....	.....	.....	7	.....	.....	.....	8
Salvation Army		2	3	10	.....	.....	.....	.....	.....	.....	18	1	.....	34
Other Denominations....		9	23	21	4	5	1	3	5	.....	.....	244	.....	315
Denomination not stated.		1	.....	.....	.....	.....	.....	.....	.....	9	9
TOTAL GROOMS.....		1,447	2,245	3,077	1,709	493	46	310	76	9	20	332	11	9,775

Licenses, 8,321.

Banns, 1,454.

Marriages by Ages in the Counties of Ontario, 1916.

(Excluding Cities and Towns).

GROOMS.															
BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 and over	Not stated	TOTAL
	15	161	1,296	558	128	37	8	6	2	1	1	.....	1	.....	2,199
	20	61	1,886	1,532	472	129	45	8	2	2	1	1	.....	.....	4,139
	25	4	308	906	462	208	67	17	9	2	2	.....	.....	.....	1,985
	30	.....	22	155	248	146	85	32	11	5	2	.....	.....	.....	706
	35	.....	4	25	51	81	55	39	20	10	2	.....	.....	.....	287
	40	.....	3	1	10	28	46	35	30	22	6	3	1	.....	185
	45	.....	.....	1	4	3	12	27	24	18	7	4	1	.....	101
	50	.....	.....	.....	.....	.....	2	8	22	13	14	7	1	.....	67
	55	.....	.....	.....	.....	2	4	1	5	10	10	10	6	3	51
	60	.....	.....	.....	.....	.....	1	1	4	5	11	7	4	.....	33
	65	.....	.....	.....	.....	.....	.....	.....	.....	2	3	5	8	.....	18
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	4
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		926	3,519	3,178	1,375	634	325	174	129	90	59	37	26	3	9,775

Marriages by Denominations in the District of Algoma, 1916.

City of Sault Ste. Marie and Town of Steelton not included.

GROOMS.	BRIDES	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican		12	6	1	2	.....	.....	.....	.....	.....	.....	.....	.....	21
Presbyterian.....		2	27	6	1	2	.....	1	.....	.....	.....	.....	.....	39
Methodist.....		2	8	17	1	.....	.....	.....	.....	.....	.....	.....	.....	28
Roman Catholic.....		2	2	1	66	2	.....	.....	.....	.....	.....	.....	.....	73
Baptist	3	.....	1	3	.....	.....	.....	.....	.....	.....	.....	7
Congregationalist.....	
Lutheran	1	1	.....	.....	.....	3	.....	.....	.....	.....	.....	5
Evangelical Association..	
Hebrew
Salvation Army.....	
Other Denominations....		3	.....	3
Denomination not stated.	
TOTAL GROOMS.....		18	47	26	71	7	.....	4	.....	.....	.....	3	.....	176

Licenses, 136. Banns, 40.

Marriages by Ages in the District of Algoma, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 and over	Not stated	TOTAL.
	15	6	43	21	2	2	.....	.....	.....	.....	.....	.....	.....	.....	74
	20	2	26	24	5	2	1	.....	.....	.....	.....	.....	.....	.....	62
	25	.....	4	7	4	3	.....	.....	.....	.....	.....	.....	.....	.....	18
	30	.....	1	1	.....	3	2	2	.....	.....	.....	.....	.....	.....	9
	35	.....	.....	1	1	1	1	2	.....	.....	.....	.....	.....	.....	6
	40	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
	45	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	2
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	2
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS.		8	76	54	12	11	4	6	1	.....	1	2	1	.....	176

Marriages by Denominations in the County of Brant, 1916.

City of Brantford not included.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican		24	4	7	.....	3	.....	.....	.....	.....	.....	.....	.....	38
Presbyterian.....		1	10	5	.....	2	2	1	.....	.....	.....	.....	.....	21
Methodist		7	5	23	.....	7	1	.....	.....	.....	.....	.....	.....	43
Roman Catholic	1	.....	.....	.....	.....	.....	.....	.....	.....	1
Baptist		3	4	5	1	13	.....	.....	.....	.....	.....	.....	.....	26
Congregationalist.....		1	1	.....	.....	2	.....	.....	.....	.....	.....	.....	4
Lutheran.....	
Evangelical Association.		1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Hebrew
Salvation Army.....		1	.....	.....	1
Other Denominations....		1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2
Denomination not stated.	
TOTAL GROOMS		36	25	41	2	25	5	1	.....	.....	1	1	.....	137

Licenses, 129.

Banns, 8.

Marriages by Ages in the County of Brant, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 and over	Not stated	Total.
	15	3	23	7	1	.....	.....	.....	.....	1	.....	.....	.....	.....	35
	20	2	34	16	6	1	.....	.....	.....	.....	.....	.....	.....	.....	59
	25	.....	3	14	3	4	3	.....	.....	.....	.....	.....	.....	.....	27
	30	.....	.....	1	1	4	.....	.....	.....	.....	.....	.....	.....	.....	6
	35	.....	.....	.....	2	1	3	.....	.....	.....	.....	.....	.....	.....	6
	40	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	2
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
		5	60	29	10	10	6	1	1	1	2	.....	.....	.....	137

Marriages by Denominations in the County of Bruce, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated	
Anglican	13	16	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	36
Presbyterian	13	81	17	.....	2	.....	1	2	.....	.....	3	.....	119
Methodist.....	13	23	53	.....	3	.....	1	.....	.....	.....	3	.....	96
Roman Catholic ,.....	.....	.....	.....	42	.....	.....	1	.....	.....	.....	.....	.....	43
Baptist	1	2	3	.....	4	.....	.....	1	.....	.....	.....	1	12
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran	1	.....	.....	.....	1	.....	12	1	.....	.....	.....	.....	15
Evangelical Association..	.....	1	.....	.....	1	.....	2	7	.....	.....	.....	.....	11
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations.....	.....	.....	1	.....	1	.....	.....	1	.....	.....	5	.....	8
Denomination not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	41	123	81	42	12	.....	17	12	.....	.....	11	1	340

Licenses, 291.

Banns, 49.

Marriages by Ages in the County of Bruce, 1916.

GROOMS.

BRIDES.	GROOMS.														TOTAL.
	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 and over	Not stated	
15	39	13	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	54
20	47	67	22	8	5	1	.....	.....	.....	.....	.....	.....	.....	150
25	6	30	21	13	3	.....	.....	.....	.....	.....	.....	.....	.....	73
30	6	19	4	.....	2	.....	.....	.....	.....	.....	.....	.....	31
35	2	1	.....	4	2	.....	2	.....	.....	.....	.....	.....	11
40	2	3	2	.....	.....	.....	.....	.....	.....	7
45	1	4	.....	.....	.....	.....	.....	.....	5
50	2	1	.....	.....	.....	.....	3
55	1	.....	.....	.....	2	3	.....	.....	.....	6
60
65
70 & over
Age not stated.
TOTALS.	92	118	64	26	15	9	6	4	3	3	.....	.....	.....	340

Marriages by Denominations in the County of Carleton, 1916.

City of Ottawa not included.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican		23	5	3	.....	.....	1	.....	.....	.....	.....	1	.....	33
Presbyterian.....		3	22	7	1	1	.....	.....	.....	.....	.....	.....	.....	34
Methodist		7	7	19	.....	1	.....	.....	.....	.....	.....	.....	.....	34
Roman Catholic		2	.....	.....	58	.....	.....	.....	.....	.....	.....	.....	.....	60
Baptist		1	.....	2	.....	3	.....	.....	.....	.....	.....	.....	.....	6
Congregationalist.....	
Lutheran
Evangelical Association..	
Hebrew
Salvation Army.....	
Other Denominations	3	.....	3
Denomination not stated.	
TOTAL GROOMS.....		36	34	31	59	5	1	.....	.....	.....	.....	4	.....	170

Licenses, 123.

Banns, 47.

Marriages by Ages in the County of Carleton, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 and over	Not stated	TOTAL.
	15	2	11	8	3	2	2	.....	.....	.....	.....	.....	.....	.....	28
	20	.....	42	29	8	3	2	.....	.....	.....	.....	.....	.....	.....	84
	25	.....	3	18	14	3	.....	.....	.....	.....	.....	.....	.....	.....	38
	30	.....	1	1	4	1	2	.....	.....	.....	.....	.....	.....	.....	9
	35	.....	.....	1	.....	2	1	1	1	.....	.....	.....	.....	.....	6
	40	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	2
	45	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS.	2	58	57	30	11	7	2	2	2	.....	.....	.....	.....	170

Marriages by Denominations in the County of Dufferin, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican		9	7	4	.....	.....	1	.....	.....	.....	.....	.....	.....	21
Presbyterian		4	19	7	.....	1	.....	.....	.....	.....	.....	.....	.....	31
Methodist		5	15	30	.....	.....	.....	.....	.....	.....	.....	4	.....	54
Roman Catholic.....		1	.....	.....	.....	.....	.....	.....	.....	.....	1
Baptist	1	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	3
Congregationalist.....		1	.....	.....	.....	.....	.....	.....	1
Lutheran.....	
Evangelical Association.....	
Hebrew
Salvation Army.....		1	.....	.....	1
Other Denominations....		1	.....	1
Denomination not stated.....	
TOTAL GROOMS		18	42	41	1	3	2	.....	.....	.....	1	5	.....	113

Licenses, 111.

Banns, 2.

Marriage by Ages in the County of Dufferin, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	2	15	6	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	25
	20	1	21	15	1	1	.....	.....	.....	.....	.....	.....	.....	.....	39
	25	.....	3	15	15	.....	2	.....	.....	.....	.....	.....	.....	.....	35
	30	.....	.....	.....	2	4	2	1	.....	.....	.....	.....	.....	.....	9
	35	.....	.....	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	3
	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	45	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		3	39	37	21	6	4	1	2	.....	.....	.....	.....	.....	113

Marriages by Denominations in the County of Elgin, 1916.

City of St. Thomas not included.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican	14	4	7	.....	5	.....	.....	.....	.....	.....	.....	.....	.....	30
Presbyterian	1	17	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	26
Methodist.....	4	5	60	.....	14	1	.....	.....	.....	.....	.....	2	.....	86
Roman Catholic.....	.....	.....	.....	.....	4	1	.....	.....	.....	.....	.....	1	.....	6
Baptist	2	1	7	.....	17	.....	.....	.....	.....	.....	.....	1	.....	29
Congregationalist.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association..	.....	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	2
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations....	.....	2	2	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	6
Denomination not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	21	30	84	4	37	2	.....	1	.....	.....	.....	6	.....	185

Licenses, 178.

Banns, 7.

Marriages by Ages in the County of Elgin, 1916.

GROOMS.

AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
15	3	21	8	2	1	1	.....	.....	.....	.....	.....	1	.....	37
20	1	49	31	6	2	.....	.....	.....	.....	.....	.....	.....	.....	89
25	.....	1	15	8	3	1	1	1	.....	.....	.....	.....	.....	30
30	.....	1	5	2	2	.....	2	1	.....	.....	.....	.....	.....	13
35	.....	.....	.....	1	2	1	1	1	.....	.....	.....	.....	.....	6
40	.....	.....	.....	1	.....	.....	2	1	.....	.....	.....	.....	.....	4
45	.....	.....	.....	.....	.....	1	1	.....	1	.....	.....	.....	.....	3
50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2	.....	3
65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS	4	72	59	20	10	4	7	4	1	.....	1	3	.....	185

Marriages by Denominations in the County of Essex, 1916.

City of Windsor and Town of Walkerville not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	E Association.	Hebrew.	Salvation Army.	Other Denominations.	Denominations not stated.	
Anglican	31	9	10	3	1	.....	.....	.....	.....	.....	.....	.....	54
Presbyterian	4	10	6	.....	3	.....	1	.....	.....	.....	.....	.....	24
Methodist.....	3	6	75	1	8	.....	.....	.....	.....	.....	.....	.....	93
Roman Catholic.....	.....	2	.....	150	.....	.....	1	.....	.....	.....	1	.....	154
Baptist	1	2	2	.....	15	.....	.....	.....	.....	.....	.....	.....	20
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	2	.....	.....	.....	.....	.....	.....	1	.....	.....	3
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22	.....	22
Denomination notstated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	39	29	95	155	27	.....	2	.....	.....	1	23	.....	371

Licenses, 244.

Banns, 127.

Marriages by Ages in the County of Essex, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	16	70	22	4	1	.....	.....	.....	.....	.....	.....	.....	.....	113
	20	6	82	42	11	3	1	.....	.....	.....	.....	.....	.....	.....	150
	25	.....	10	27	9	3	3	.....	.....	.....	.....	.....	.....	.....	52
	30	.....	.....	1	9	5	7	.....	1	.....	.....	.....	.....	.....	23
	35	.....	.....	1	1	1	1	3	.....	.....	.....	.....	.....	.....	7
	40	.....	.....	.....	.....	2	6	.....	2	1	1	.....	.....	.....	12
	45	.....	.....	.....	1	.....	.....	.....	4	1	1	.....	.....	.....	7
	50	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	3
	55	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	1	3
	60	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS.		22	167	93	35	15	18	3	11	4	2	.....	.....	1	371

· City of Kingston not included.

Banns, 12.

GROOMS.

BRIDES	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL	
	15	1	14	9	3	1	.....	.....	.....	.....	.....	.....	.....	.....	28
	20	1	18	16	2	2	.....	.....	.....	.....	.....	.....	.....	.....	39
	25	.....	3	7	7	4	1	.....	.....	.....	.....	.....	.....	.....	22
	30	.....	.....	3	3	.....	1	.....	.....	.....	.....	.....	.....	.....	7
	35	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
	40	.....	.....	.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....	2
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS.	2	35	36	17	7	2	1	1	101

Marriages by Denominations in the County of Grey, 1916.

Town of Owen Sound not included.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutherin.	Evangelical Association.	Hebrew.	Salvation Army.	Others Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican		19	5	11	.....	2	.....	1	.....	.....	.....	1	.....	39
Presbyterian		13	71	21	1	2	.....	1	.....	.....	.....	1	.....	110
Methodist.....		11	18	62	.....	4	.....	2	.....	.....	.....	1	.....	98
Roman Catholic	20	.....	.....	.....	.....	.....	.....	.....	.....	20
Baptist		3	5	9	.....	6	.....	.....	.....	.....	.....	.....	.....	23
Congregationalist
Lutheran	5	1	.....	.....	.....	34	1	.....	.....	.....	.....	41
Evangelical Association	1	1	.....	.....	.....	.....	2
Hebrew
Salvation Army.....		1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Other Denominations..		1	2	1	.....	.....	.....	.....	.....	.....	.....	5	.....	9
Denomination not stated	
TOTAL GROOMS.....		47	107	105	21	14	.....	39	2	.....	.....	8	.....	343

Licenses, 314.

Banns, 29.

Marriages by Ages in the County of Grey, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	5	31	17	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	54
	20	2	63	63	16	6	2	1	1	.....	.....	.....	.....	.....	154
	25	.....	10	42	20	9	2	1	.....	.....	.....	.....	.....	.....	84
	30	.....	1	6	8	8	4	1	.....	.....	.....	.....	.....	.....	28
	35	.....	.....	.....	1	3	4	1	.....	.....	.....	.....	.....	.....	9
	40	.....	.....	.....	1	2	1	.....	1	2	.....	.....	.....	.....	7
	45	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	2
	55	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	2
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
	70 & over.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS.		7	105	128	47	28	13	5	2	4	2	1	1	.....	343

Marriages by Denominations in the County of Haldimand, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Heb.ew.	Salvation Army.	Other Denomina-tions.	Denomination not stated.	
Anglican	13	5	5	.....	.....	.....	.....	.....	.....	.....	2	.....	25
Presbyterian	3	12	9	.....	.....	.....	1	.....	.....	.....	.....	.....	25
Methodist	3	10	31	1	4	.....	2	1	.....	.....	1	.....	53
Roman Catholic.....	.....	1	2	6	.....	.....	.....	.....	.....	.....	.....	.....	9
Baptist.....	2	2	10	.....	4	.....	.....	.....	.....	.....	2	.....	20
Congregationalist .....	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	2
Lutheran .....	.....	.....	1	.....	1	.....	9	.....	.....	.....	.....	.....	11
Evangelical Association .....	.....	.....	.....	.....	1	.....	1	4	.....	.....	.....	.....	6
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations	1	.....	2	.....	1	.....	1	1	.....	.....	7	.....	13
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	22	30	60	7	12	.....	15	6	.....	.....	12	.....	164

Licenses, 154.

Banns, 10.

Marriages by Ages in the County of Haldimand, 1916.

GROOMS															
BRIDES.	Age.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	7	18	8	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	37
	20	2	36	26	8	2	....	.....	.....	.....	.....	.....	.....	.....	74
	25	.....	6	11	6	6	....	.....	.....	.....	.....	.....	.....	.....	29
	30	.....	.....	4	2	2	1	..	.....	1	.....	.....	.....	.....	10
	35	.....	1	.....	.....	1	2	2	.....	.....	.....	.....	.....	.....	6
	40	.....	.....	.....	1	1	.....	1	..	1	.....	.....	.....	.....	4
	45	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	2
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		9	61	49	21	12	4	3	1	3	....	.....	1	.....	164

Marriages by Denominations in the County of Haliburton, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	4	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	6
Presbyterian	1	4	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	6
Methodist	1	2	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	12
Roman Catholic .....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
Baptist .....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denomination not stated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	6	6	12	1	1	.....	.....	.....	.....	.....	.....	.....	26

Licenses, 25.

Banns, 1.

Marriages by Ages in the County of Haliburton, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	.....	4	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
	20	.....	5	5	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	13
	25	.....	2	1	1	.....	1	.....	.....	1	.....	.....	.....	.....	6
	30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS	.....	11	8	5	.....	.....	1	.....	.....	1	.....	.....	.....	.....	26

Marriages by Denominations in the County of Halton, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	21	7	4	1	.....	.....	.....	.....	1	.....	.....	.....	34
Presbyterian	7	29	8	.....	1	.....	.....	.....	.....	.....	.....	.....	45
Methodist.....	2	12	27	.....	1	.....	.....	.....	.....	.....	.....	.....	42
Roman Catholic.....	.....	1	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	4
Baptist .....	.....	3	3	.....	3	.....	.....	.....	.....	.....	.....	.....	9
Congregationalist.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Lutheran.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	2
Denomination not stated.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	30	53	42	5	6	.....	.....	.....	1	.....	.....	.....	137

Licenses, 131.

Banns, 6.

Marriages by Ages in the County of Halton, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	.....	12	3	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	20
20	26	26	10	1	1	1	.....	.....	.....	.....	.....	.....	.....	65
25	5	13	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22
30	4	3	7	2	.....	.....	.....	.....	.....	.....	.....	.....	16
35	1	1	1	1	.....	1	.....	.....	.....	.....	.....	.....	5
40	2	1	.....	.....	.....	.....	.....	1	.....	4
45	1	.....	.....	.....	.....	.....	.....	.....	1
50	1	1	.....	.....	.....	.....	.....	2
55	1	.....	.....	.....	.....	.....	1
60	1	.....	.....	.....	.....	1
65
70 & over
Age not stated.
TOTALS	43	47	23	9	6	3	2	2	1	.....	1	.....	.....	137

Marriages by Denominations in the County of Huron, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	18	10	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	40
Presbyterian	17	89	28	1	3	.....	.....	1	.....	.....	.....	.....	139
Methodist.....	11	22	99	.....	.....	1	2	.....	.....	.....	.....	.....	135
Roman Catholic	2	.....	.....	29	.....	.....	.....	.....	.....	.....	.....	.....	31
Baptist .....	.....	1	3	1	1	.....	.....	.....	.....	.....	.....	.....	6
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran	1	.....	3	.....	.....	.....	13	.....	.....	.....	.....	.....	17
Evangelical Association .....	.....	.....	1	.....	.....	.....	1	1	.....	.....	.....	.....	3
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Other Denominations..	.....	1	.....	.....	.....	.....	.....	1	.....	.....	1	.....	3
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	49	123	147	31	4	1	16	3	.....	.....	1	.....	375

Licenses, 349.

Banns, 26.

Marriages by Ages in the County of Huron, 1916.

GROOMS.															
BRIDES	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	1	34	16	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	54
	20	.....	64	67	19	3	1	.....	.....	.....	.....	.....	.....	.....	154
	25	.....	11	50	28	10	4	1	1	1	.....	.....	.....	.....	106
	30	.....	.....	6	12	11	4	.....	.....	.....	.....	.....	.....	.....	33
	35	.....	.....	.....	2	5	2	3	.....	2	.....	.....	.....	.....	14
	40	.....	1	.....	.....	.....	1	.....	.....	1	.....	1	.....	.....	4
	45	.....	.....	.....	.....	.....	1	.....	1	.....	1	.....	.....	.....	3
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	2	.....	.....	1	.....	.....	.....	1	4
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS.		1	110	139	64	29	15	4	2	5	2	1	2	1	375

Marriages by Denominations in the District of Kenora, 1916.

Town of Kenora not included.

GROOMS	BRIDES.												TOTAL BRIDES.
	Anglican,	Presbyterian	Methodist.	Roman Catholic.	Baptist.	Congregationalist	Lutheran.	Evangelical Association.	Hebrew,	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	3	1	2	1	.....	.....	.....	.....	.....	.....	.....	.....	7
Presbyterian	1	5	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	7
Methodist.....	1	3	5	.....	.....	1	.....	.....	.....	.....	.....	.....	10
Roman Catholic .....	.....	.....	1	3	.....	.....	.....	.....	.....	.....	.....	.....	4
Baptist.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	5	.....	.....	.....	.....	.....	5
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	5	10	8	4	1	1	5	.....	.....	.....	.....	.....	34

Licenses. 34.

Banns. ..

Marriages by Ages in the District of Kenora, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	.....	5	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	8
	20	.....	9	8	1	2	.....	.....	.....	.....	.....	.....	.....	.....	20
	25	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
	30	.....	.....	.....	.....	1	.....	.....	.....	.....	1	.....	.....	.....	2
	35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS	.....	14	12	2	4	.....	.....	.....	.....	.....	2	.....	.....	.....	34

Marriages by Denominations in the County of Kent, 1916.

City of Chatham not included.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican	7	6	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	15
Presbyterian	6	30	14	1	3	.....	1	.....	.....	.....	.....	.....	.....	55
Methodist	4	15	72	1	8	.....	1	.....	.....	.....	.....	.....	.....	101
Roman Catholic	1	1	.....	70	.....	.....	.....	.....	.....	.....	.....	.....	.....	72
Baptist .....	.....	2	6	.....	14	.....	.....	.....	.....	.....	.....	.....	.....	22
Congregationalist .....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Other Denominations .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	4
Denomination not stated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	19	54	92	73	26	1	2	.....	.....	.....	.....	4	.....	271

Licenses, 211.

Banns, 60.

Marriages by Ages in the County of Kent, 1916.

GROOMS.

BRIDES.	AGES	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	4	48	19	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	75
	20	5	64	41	7	3	1	.....	.....	.....	.....	.....	.....	.....	121
	25	1	8	14	17	4	2	1	1	.....	.....	.....	.....	.....	48
	30	.....	.....	1	6	1	4	.....	.....	.....	.....	.....	.....	.....	12
	35	.....	.....	.....	1	3	.....	1	.....	.....	.....	.....	.....	.....	5
	40	.....	.....	.....	.....	.....	3	.....	2	.....	.....	.....	.....	.....	5
	45	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	2
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS.		10	120	75	35	11	10	2	5	.....	2	.....	1	.....	271

Marriages by Denominations in the County of Lambton, 1916.

City of Sarnia not included.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican		19	5	6	.....	1	.....	.....	.....	.....	.....	.....	.....	31
Presbyterian.....		9	57	10	.....	3	.....	1	.....	.....	.....	.....	.....	80
Methodist		8	19	66	1	6	1	1	.....	.....	.....	2	.....	104
Roman Catholic		1	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	.....	6
Baptist	7	6	1	14	.....	.....	.....	.....	.....	.....	.....	28
Congregationalist.....		1	.....	.....	3	.....	.....	.....	.....	.....	.....	4
Lutheran
Evangelical Association
Hebrew
Salvation Army.....		1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	2
Others Denominations.		15	.....	15
Denomination not stated	
TOTAL GROOMS		38	88	89	7	24	4	2	.....	.....	1	17	.....	270

Licenses, 266.

Banns, 4.

Marriages by Ages in the County of Lambton, 1916.

GROOMS.

BRIDES	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	7	44	12	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	66
	20	2	50	47	13	2	1	.....	.....	.....	.....	.....	.....	.....	115
	25	.....	5	23	11	5	1	.....	.....	.....	.....	.....	.....	.....	45
	30	.....	.....	3	6	2	2	2	1	.....	.....	.....	.....	.....	16
	35	.....	.....	1	3	1	4	2	1	.....	.....	.....	.....	.....	12
	40	.....	1	.....	.....	1	2	2	.....	3	.....	.....	.....	.....	9
	45	.....	.....	.....	.....	.....	1	2	.....	2	.....	.....	.....	.....	5
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		9	100	86	36	11	11	8	2	6	.....	.....	1	.....	270

Marriages by Denominations in the County of Lanark, 1916.

Town of Smith's Falls not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	30	11	6	.....	3	.....	.....	.....	.....	.....	1	.....	51
Presbyterian	9	52	12	1	5	1	.....	.....	.....	.....	.....	.....	80
Methodist.....	8	11	14	1	5	.....	.....	.....	.....	.....	1	.....	40
Roman Catholic.....	.....	.....	.....	27	.....	1	.....	.....	.....	.....	.....	.....	28
Baptist	2	3	1	.....	.....	1	.....	.....	.....	.....	1	.....	8
Congregationalist	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
Lutheran .....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Other Denominations....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2
Denomination not stated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	50	80	33	29	14	3	.....	.....	.....	.....	5	.....	214

Licenses, 186.

Banns, 28.

Marriages by Ages in the County of Lanark, 1916.

GROOMS.

BRIDES.	GROOMS.														TOTALS.
	AGES.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	
	15	1	16	11	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	30
	20	1	38	26	12	4	2	.....	.....	.....	.....	.....	.....	.....	83
	25	.....	8	27	12	6	.....	.....	.....	.....	.....	.....	.....	.....	53
	30	.....	.....	3	7	8	3	4	1	.....	.....	.....	.....	.....	26
	35	.....	.....	.....	5	3	2	1	1	.....	.....	.....	.....	.....	12
	40	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	2
	45	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	2
	50	.....	.....	.....	.....	.....	.....	1	1	.....	.....	1	.....	.....	3
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2	.....	3
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS.	2	62	67	38	23	8	7	3	.....	.....	2	2	.....	214

Marriages by Denominations in the Counties of Leeds and Grenville, 1916.

Town of Brockville not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	39	14	11	2	1	.....	.....	.....	.....	.....	.....	.....	67
Presbyterian	5	24	11	2	.....	.....	1	.....	.....	.....	.....	.....	43
Methodist	21	20	95	2	1	.....	.....	.....	.....	.....	.....	.....	139
Roman Catholic	2	1	5	24	.....	.....	.....	.....	.....	.....	.....	.....	32
Baptist	3	2	1	.....	3	.....	.....	.....	.....	.....	.....	.....	9
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations ..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2
Denomination not stated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	70	61	123	30	5	.....	1	.....	.....	.....	2	.....	292

Licenses, 266.

Banns, 26.

Marriages by Ages in the Counties of Leeds and Grenville, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	7	31	16	2	1	.....	.....	.....	.....	.....	.....	.....	.....	57
	20	1	62	39	22	7	2	.....	.....	.....	1	.....	.....	.....	134
	25	1	10	19	15	4	1	1	1	.....	.....	.....	.....	.....	52
	30	.....	1	10	7	5	1	1	.....	.....	.....	.....	.....	.....	25
	35	.....	.....	.....	1	3	3	.....	.....	1	.....	.....	.....	.....	3
	40	.....	.....	.....	1	2	1	1	2	1	.....	.....	.....	.....	8
	45	.....	.....	.....	.....	1	.....	1	1	.....	.....	.....	.....	.....	3
	50	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1	.....	.....	2
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	.....	.....	2
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS.		9	104	84	48	23	8	5	5	2	2	1	1	.....	292

Marriages by Denominations in the Counties of Lennox and Addington, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Others Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican	6	1	6	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	15
Presbyterian.....	1	5	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11
Methodist	6	9	70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	85
Roman Catholic .....	.....	.....	2	13	.....	.....	.....	.....	.....	.....	.....	1	.....	16
Baptist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
TOTAL GROOMS.....	13	16	84	15	.....	.....	.....	.....	.....	.....	.....	1	1	130

Licenses, 118.

Banns, 12.

Marriages by Ages in the Counties of Lennox and Addington, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	1	17	9	2	.....	1	1	.....	.....	.....	.....	.....	.....	31
	20	1	28	20	6	5	1	.....	.....	.....	.....	.....	.....	.....	61
	25	1	5	5	3	4	2	.....	1	.....	.....	.....	.....	.....	21
	30	.....	.....	2	1	2	.....	.....	.....	.....	.....	.....	.....	.....	5
	35	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	2
	40	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	2
	45	.....	.....	.....	.....	.....	.....	1	.....	.....	2	.....	.....	.....	3
	50	.....	.....	.....	.....	.....	.....	1	.....	1	.....	1	.....	.....	3
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	2
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	3	50	36	12	11	5	3	3	3	3	1	.....	.....	130

Marriages by Denominations in the District of Manitoulin, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	6	3	2	.....	1	.....	.....	.....	.....	.....	.....	.....	12
Presbyterian	2	21	5	.....	.....	.....	.....	.....	.....	.....	1	.....	29
Methodist.....	5	4	13	.....	1	.....	.....	.....	.....	.....	.....	.....	23
Roman Catholic.....	1	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	5
Baptist	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations ..	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	4
Denomination not stated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	15	30	20	4	2	.....	1	.....	.....	.....	4	.....	76

Licenses, 72.

Banns, 4.

Marriages by Ages in the District of Manitoulin, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & ov'r	Not stated	TOTAL.
	15	.....	11	10	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	22
20	12	12	6	2	2	.....	.....	.....	.....	.....	.....	.....	34
25	3	3	1	.....	.....	.....	2	.....	.....	.....	.....	.....	9
30	1	1	.....	2	.....	.....	.....	.....	.....	.....	.....	4
35	2	.....	.....	.....	.....	.....	.....	.....	.....	2
40	2	1	.....	.....	.....	.....	.....	.....	3
45	1	.....	.....	.....	.....	1
50
55
60	1	.....	.....	.....	.....	1
65
70 & over
Age not stated.
TOTALS.	26	26	9	4	6	1	2	2	.....	.....	.....	.....	.....	76

Marriages by Denominations in the County of Middlesex, 1916.

City of London not included.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican.....	22	10	8	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	41
Presbyterian	16	51	13	.....	5	.....	.....	.....	.....	.....	.....	.....	.....	85
Methodist.....	10	12	77	.....	4	.....	1	.....	.....	.....	.....	.....	.....	104
Roman Catholic .....	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
Baptist .....	.....	6	8	.....	4	.....	1	.....	.....	1	.....	.....	.....	20
Congregationalist.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	2
Lutheran .....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	5	.....	7
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	49	80	107	6	14	1	2	.....	.....	.....	1	5	.....	265

Licenses, 261.

Banns, 4.

Marriages by Ages in the County of Middlesex, 1916.

GROOMS

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	5	27	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	41
	20	.....	40	50	19	2	4	.....	.....	.....	.....	.....	.....	.....	115
	25	.....	9	27	16	6	3	.....	.....	.....	.....	.....	.....	.....	61
	30	.....	.....	7	6	4	3	.....	1	.....	.....	.....	.....	.....	21
	35	.....	.....	.....	1	4	1	1	.....	.....	.....	.....	.....	.....	7
	40	.....	.....	.....	1	.....	1	.....	.....	2	.....	.....	.....	.....	4
	45	.....	.....	.....	1	1	1	2	.....	3	.....	.....	.....	.....	8
	50	.....	.....	.....	.....	.....	.....	1	2	1	.....	.....	.....	.....	4
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	3	.....	4
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	5	76	93	44	17	13	4	3	7	.....	.....	3	.....	265

Marriages by Denominations in the District of Muskoka, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican.....	18	5	2	2	.....	.....	.....	.....	.....	.....	.....	.....	27
Presbyterian	5	28	6	.....	2	.....	.....	.....	.....	.....	.....	.....	41
Methodist.....	9	5	24	.....	1	.....	1	.....	.....	1	.....	.....	41
Roman Catholic.....	1	.....	2	14	.....	.....	.....	.....	.....	.....	.....	.....	17
Baptist.....	2	.....	2	.....	3	.....	.....	.....	.....	.....	.....	.....	7
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	1	2	.....	.....	.....	.....	.....	.....	1	.....	.....	4
Other Denominations..	1	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	3
Denomination not stated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
TOTAL GROOMS	36	39	38	16	7	.....	2	.....	.....	2	1	1	142

Licenses, 126.

Banns 16.

Marriages by Ages in the District of Muskoka, 1916.

GROOMS.

	AGE.	BRIDES.												Not stated	TOTAL.
		15	20	25	30	35	40	45	50	55	60	65	70 & over		
	15	3	26	20	3	1	1	1	.....	.....	.....	.....	.....	.....	55
	20	.....	36	16	7	2	1	.....	.....	.....	.....	.....	.....	.....	52
	25	.....	3	16	3	.....	1	.....	.....	.....	.....	.....	.....	.....	23
	30	.....	1	2	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
	35	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
	40	.....	.....	.....	.....	1	1	.....	.....	.....	1	.....	.....	.....	3
	45	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS.	3	56	54	17	4	5	2	.....	.....	1	.....	.....	.....	142

Marriages by Denominations in the District of Nipissing, 1916.

Town of North Bay not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican.....	3	1	1	.....	3	.....	.....	.....	.....	.....	.....	.....	8
Presbyterian .....	.....	8	2	.....	1	.....	.....	.....	.....	.....	.....	.....	11
Methodist.....	1	1	8	1	1	.....	.....	.....	.....	.....	.....	.....	12
Roman Catholic	1	.....	2	140	.....	.....	.....	.....	.....	.....	.....	.....	143
Baptist.....	.....	1	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	3
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	2
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations.. ..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2
Denomination not stated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	5	11	13	141	7	.....	2	.....	.....	.....	2	.....	181

Licenses, 76.

Banns, 105.

Marriages by Ages in the District of Nipissing, 1916.

GROOMS.

	AGE.													Not stated	TOTAL.
		15	20	25	30	35	40	45	50	55	60	65	70 & over		
BRIDES.	15	4	35	24	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	70
	20	2	27	28	9	2	1	.....	.....	.....	.....	.....	.....	.....	69
	25	.....	4	10	4	3	2	1	.....	.....	.....	.....	.....	.....	24
	30	.....	.....	3	4	3	1	1	.....	.....	.....	.....	.....	.....	12
	35	.....	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	60	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	6	66	65	28	8	4	2	1	.....	1	.....	.....	.....	181

Marriages by Denominations in the County of Norfolk, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Others Denominations.	Denomination not stated.	
Anglican.....	16	2	10	1	3	.....	.....	.....	.....	.....	.....	.....	32
Presbyterian	5	10	8	1	4	.....	.....	.....	.....	.....	.....	.....	28
Methodist.....	7	3	55	.....	11	.....	.....	.....	.....	.....	.....	.....	76
Roman Catholic .....	.....	.....	1	11	.....	.....	.....	.....	.....	.....	.....	.....	12
Baptist	6	2	11	.....	43	.....	.....	.....	.....	.....	2	.....	64
Congregationalist .....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Lutheran .....	.....	.....	1	.....	.....	.....	4	.....	.....	.....	.....	.....	5
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	3
Other Denominations..	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	4
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	34	19	87	13	61	.....	4	.....	.....	3	4	.....	225

Licenses, 214.

Banns, 11.

Marriages by Ages in the County of Norfolk, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	10	48	9	2	1	1	.....	.....	.....	.....	.....	.....	.....	71
	20	1	51	31	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	89
	25	.....	.....	24	7	1	1	1	.....	.....	1	.....	.....	.....	35
	30	.....	.....	5	2	1	3	1	.....	1	.....	.....	.....	.....	13
	35	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	40	.....	.....	.....	.....	2	2	1	2	.....	.....	.....	.....	.....	7
	45	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	1	.....	.....	.....	1	1	.....	.....	3
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	1	.....	3
	60	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		11	99	69	17	6	8	3	4	1	3	3	1	.....	225

Marriages by Denominations in the District of Parry Sound, 1916.

• Town of Parry Sound not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	8	3	2	.....	1	.....	.....	.....	.....	.....	.....	.....	14
Presbyterian	2	25	6	.....	1	.....	.....	1	.....	.....	1	....	36
Methodist.....	2	5	25	.....	2	.....	.....	.....	.....	.....	1	.....	35
Roman Catholic .....	.....	.....	.....	20	.....	.....	.....	.....	.....	.....	1	....	21
Baptist	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	2
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran	1	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	3
Evangelical Association .....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	4
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	14	33	34	20	5	.....	2	1	.....	.....	7	.....	116

Licenses, 96.

Banns, 20.

Marriages by Ages in the District of Parry Sound, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	1	22	10	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	39
20	1	15	16	7	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	42
25	1	3	9	3	3	1	1	.....	.....	.....	.....	.....	.....	.....	21
30	.....	.....	2	3	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	6
35	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
40	.....	.....	.....	.....	.....	.....	2	1	1	.....	.....	.....	.....	.....	4
45	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
50	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS	3	40	37	19	8	1	4	1	2	1	.....	.....	.....	.....	116

Marriages by Denominations in the County of Peel, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	21	3	4	1	2	.....	.....	.....	.....	.....	.....	.....	31
Presbyterian	6	19	11	.....	1	.....	1	.....	.....	.....	.....	.....	38
Methodist.....	4	8	41	1	1	.....	.....	.....	.....	.....	.....	.....	55
Roman Catholic.....	.....	.....	1	6	.....	.....	.....	.....	.....	.....	1	.....	8
Baptist .....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	2
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	31	31	57	8	5	.....	1	.....	.....	.....	1	.....	134

Licenses, 128.

Banns, 6.

Marriages by Ages in the County of Peel, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	1	8	5	2	.....	.....	.....	1	.....	.....	.....	.....	.....	17
	20	.....	25	17	6	1	.....	.....	.....	.....	.....	.....	.....	.....	49
	25	.....	7	20	9	8	.....	.....	1	.....	.....	.....	.....	.....	45
	30	.....	.....	3	5	4	1	1	1	.....	.....	.....	.....	.....	15
	35	.....	.....	.....	1	.....	1	.....	1	.....	.....	.....	.....	.....	3
	40	.....	.....	.....	.....	.....	1	1	.....	1	.....	.....	.....	.....	3
	45	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS.		1	40	45	23	13	3	2	6	1	.....	.....	.....	.....	134

Marriages by Denominations in the County of Perth, 1916.

City of Stratford not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	10	5	5	.....	2	1	.....	.....	.....	.....	.....	.....	23
Presbyterian.....	5	44	9	.....	2	.....	2	.....	.....	.....	.....	.....	62
Methodist.....	6	13	56	1	3	.....	3	.....	.....	.....	.....	.....	82
Roman Catholic.....	.....	.....	.....	14	.....	.....	.....	.....	.....	.....	.....	.....	14
Baptist	1	2	4	.....	1	.....	.....	.....	.....	.....	.....	.....	8
Congregationalist	1	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	3
Lutheran	1	2	4	.....	.....	.....	27	.....	1	.....	.....	.....	35
Evangelical Association .....	.....	1	.....	.....	.....	.....	1	9	.....	.....	.....	.....	11
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	4	.....	5
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	24	67	79	15	8	3	33	9	2	.....	4	.....	244

Licenses, 226.

Banns, 18.

Marriages by Ages in the County of Perth, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	2	18	9	6	2	.....	.....	.....	.....	.....	.....	.....	.....	37
	20	.....	43	36	17	2	.....	.....	.....	.....	.....	.....	.....	.....	98
	25	.....	11	37	16	4	3	.....	.....	.....	.....	.....	.....	.....	71
	30	.....	2	4	11	3	3	1	1	.....	.....	.....	.....	.....	25
	35	.....	.....	.....	1	2	1	1	.....	.....	.....	.....	.....	.....	5
	40	.....	.....	.....	.....	1	2	.....	.....	.....	.....	.....	.....	.....	3
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	1	2	.....	2	.....	.....	.....	5
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS.		2	74	86	51	14	9	3	3	.....	2	.....	.....	.....	244

Marriages by Denominations in the County of Peterborough, 1916.

City of Peterborough not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	10	1	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	14
Presbyterian	3	13	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	23
Methodist	5	5	32	.....	3	.....	.....	.....	.....	.....	2	.....	47
Roman Catholic	1	.....	.....	28	.....	.....	.....	.....	.....	.....	.....	.....	29
Baptist	1	2	1	.....	3	.....	.....	.....	.....	.....	.....	.....	7
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denomination not stated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	20	21	43	28	6	.....	.....	.....	.....	.....	2	.....	120

Licenses, 92.

Banns, 28.

Marriages by Ages in the County of Peterborough, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	1	9	10	3	2	.....	.....	.....	.....	.....	.....	.....	.....	25
20	17	23	7	5	.....	.....	.....	.....	.....	.....	.....	.....	52
25	3	12	6	.....	1	1	.....	.....	.....	.....	.....	.....	23
30	1	.....	3	3	.....	1	.....	.....	.....	.....	.....	.....	8
35	1	2	1	.....	1	.....	.....	.....	.....	.....	5
40	1	1	1	.....	.....	.....	.....	.....	3
45	1	.....	.....	.....	.....	.....	.....	1
50	1	.....	.....	.....	1
55	1	.....	.....	1	.....	.....	.....	.....	.....	2
60
65
70 & over
Age not stated.
TOTALS	1	30	45	20	13	3	4	3	.....	1	.....	.....	.....	120

Marriages by Denominations in the Counties of Prescott and Russell, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican	11	3	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17
Presbyterian	1	19	1	1	.....	1	.....	.....	.....	.....	.....	.....	.....	23
Methodist.....	2	2	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12
Roman Catholic .....	.....	2	.....	289	.....	.....	.....	.....	.....	.....	.....	.....	.....	291
Baptist.....	1	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	3
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	15	26	13	290	1	1	1	.....	1	.....	1	.....	.....	349

Licenses, 137.

Banns, 212.

Marriages by Ages in the Counties of Prescott and Russell, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	7	55	19	3	3	.....	.....	.....	.....	.....	.....	.....	.....	87
	20	4	82	58	19	7	1	3	.....	.....	.....	.....	.....	.....	174
	25	.....	10	21	12	3	1	1	.....	.....	.....	.....	.....	.....	48
	30	.....	.....	5	3	3	2	.....	1	.....	.....	.....	.....	.....	14
	35	.....	1	.....	.....	2	1	2	.....	.....	.....	.....	.....	.....	6
	40	.....	.....	.....	.....	1	1	2	1	.....	.....	.....	.....	.....	5
	45	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	1	.....	2
	50	.....	.....	.....	.....	.....	.....	2	.....	2	.....	.....	.....	.....	4
	55	.....	.....	.....	.....	.....	.....	.....	1	1	.....	1	.....	.....	2
	60	.....	.....	.....	.....	.....	.....	.....	.....	1	1	2	.....	.....	4
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2	.....	.....	3
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		11	148	103	37	19	7	10	3	3	2	5	1	.....	349

Marriages by Denominations in the County of Prince Edward, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican.....	9	.....	7	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	17
Presbyterian	2	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8
Methodist.....	6	8	50	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	74
Roman Catholic.....	1	.....	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
Baptist.....	1	1	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	4
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Denomination not stated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	19	10	73	5	1	.....	.....	.....	.....	.....	.....	3	.....	111

Licenses, 107.

Banns, 4.

Marriages by Ages in the County of Prince Edward, 1916.

BRIDES.	GROOMS.													
	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated
	15	6	27	4	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
	20	2	21	11	1	.....	1	.....	.....	.....	.....	.....	.....	.....
	25	.....	6	8	4	1	.....	.....	.....	.....	.....	.....	.....	.....
	30	.....	1	1	2	1	1	.....	.....	.....	.....	.....	.....	.....
	35	.....	.....	1	1	.....	.....	1	.....	.....	.....	.....	.....	.....
	40	.....	.....	.....	.....	1	1	1	1	.....	.....	.....	.....	.....
	45	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS.	8	55	25	9	3	4	2	1	1	3	.....	.....	.....	111

Marriages by Denominations in the District of Rainy River, 1916.

GROOMS.	BRIDES.												
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican	11	2	.....	1	.....	.....	1	.....	.....	.....	.....	.....	15
Presbyterian	3	13	2	1	.....	.....	.....	.....	.....	.....	.....	.....	19
Methodist.....	1	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
Roman Catholic.....	2	.....	.....	12	.....	.....	.....	.....	.....	.....	.....	.....	14
Baptist .....	.....	1	.....	1	1	.....	.....	.....	.....	.....	.....	.....	3
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	7	.....	.....	.....	1	.....	8
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
Other Denominations..	.....	1	1	.....	.....	.....	.....	.....	.....	.....	5	.....	7
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	17	18	8	15	1	.....	8	.....	.....	1	6	.....	74

Licenses, 59.

Banns, 15.

Marriages by Ages in the District of Rainy River, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	1	16	10	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	30
20	8	7	5	2	.....	.....	.....	.....	.....	.....	.....	.....	22
25	1	5	4	2	1	.....	.....	.....	.....	.....	.....	.....	13
30	1	1	.....	.....	.....	1	.....	.....	.....	.....	.....	3
35	1	.....	.....	.....	.....	.....	.....	1
40	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
45	2	2	.....	.....	.....	.....	.....	.....	4
50
55
60
65
70 & over
Age not stated.
TOTALS.	1	25	23	14	4	3	3	1	.....	.....	.....	.....	.....	74

Marriages by Denominations in the County of Renfrew, 1916.

Town of Pembroke not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	10	3	2	.....	1	.....	.....	.....	.....	.....	.....	.....	16
Presbyterian	11	47	13	4	1	1	.....	.....	.....	.....	.....	.....	77
Methodist.....	4	12	26	.....	.....	.....	.....	.....	.....	.....	.....	.....	42
Roman Catholic	2	3	.....	96	.....	.....	.....	1	.....	.....	.....	.....	102
Baptist	2	3	2	1	4	.....	.....	2	.....	.....	.....	.....	14
Congregationalist.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
Lutheran	3	1	1	.....	1	1	23	2	.....	.....	.....	.....	32
Evangelical Association .....	.....	.....	1	.....	2	.....	3	7	.....	.....	.....	.....	13
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	4
Denomination not stat'd .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	34	69	45	101	9	3	26	12	1	.....	2	.....	302

Licenses, 202.

Banns. 100.

Marriages by Ages in the County of Renfrew, 1916.

GROOMS.

	AGE.	BRIDES.													TOTAL.
		15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	
	15	3	28	25	3	3	.....	.....	.....	.....	.....	.....	.....	.....	62
	20	.....	55	56	21	5	.....	.....	.....	.....	.....	.....	.....	.....	137
	25	.....	10	25	17	9	2	2	.....	.....	.....	.....	.....	.....	65
	30	.....	2	8	4	3	2	1	.....	.....	.....	.....	.....	.....	20
	35	.....	1	.....	1	3	.....	1	1	1	.....	.....	.....	.....	8
	40	.....	.....	.....	.....	1	2	.....	1	.....	.....	.....	.....	.....	4
	45	.....	.....	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	2
	50	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	2
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	3	96	114	46	24	7	5	3	2	1	.....	1	.....	302

Marriages by Denominations in the County of Simcoe, 1916.

Towns of Barrie, Collingwood, Midland and Orillia not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Others Denominations.	Denomination not stated.	
Anglican	32	17	19	1	1	1	.....	.....	.....	.....	.....	.....	71
Presbyterian.....	11	51	17	2	1	1	.....	.....	.....	.....	2	.....	85
Methodist.....	13	14	60	1	2	.....	1	.....	.....	.....	1	.....	92
Roman Catholic .....	.....	2	1	36	.....	.....	...	.....	.....	.....	.....	.....	39
Baptist	3	1	1	1	3	.....	.....	.....	.....	.....	.....	.....	9
Congregationalist.....	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	1	1	.....	.....	.....	.....	.....	.....	.....	5	.....	7
Denomination not stat'd	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	60	87	100	41	7	2	1	.....	.....	.....	2	.....	306

Licenses, 263.

Banns, 43.

Marriages by Ages in the County of Simcoe, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	3	47	15	7	.....	....	.....	.....	.....	1	.....	.....	.....	73
	20	1	28	57	19	5	2	1	....	.....	.....	.....	.....	.....	113
	25	.....	11	34	9	11	1	.....	.....	.....	.....	.....	.....	.....	66
	30	.....	.....	9	11	4	4	2	1	.....	.....	.....	.....	.....	31
	35	.....	.....	1	3	4	3	1	.....	....	.....	.....	.....	.....	12
	40	.....	.....	.....	.....	3	....	.....	1	.....	....	.....	.....	.....	4
	45	.....	.....	.....	.....	.....	2	....	1	1	.....	....	.....	.....	4
	50	.....	.....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	1	....	....	.....	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	4	86	116	49	27	12	4	3	2	1	.....	2	.....	306

Marriages by Denominations in the Counties of Stormont, Dundas and Glengarry, 1916.

Town of Cornwall not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican.....	3	8	7	1	1	.....	2	.....	.....	.....	.....	.....	27
Presbyterian	9	54	21	1	4	1	3	.....	.....	.....	.....	.....	93
Methodist.....	7	18	64	.....	.....	1	3	.....	.....	.....	.....	.....	93
Roman Catholic.....	2	7	3	120	.....	.....	.....	.....	.....	.....	1	.....	133
Baptist.....	.....	2	2	.....	3	.....	.....	.....	.....	.....	.....	.....	7
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran	2	1	5	.....	.....	.....	2	.....	.....	.....	.....	.....	10
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	28	90	103	122	8	2	10	.....	.....	.....	1	.....	364

Licenses, 284.

Banns, 80.

Marriages by Ages in the Counties of Stormont, Dundas and Glengarry, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	15	55	15	2	1	.....	.....	.....	.....	.....	.....	.....	.....	88
	20	4	84	46	15	4	4	.....	.....	.....	.....	1	.....	.....	158
	25	.....	11	27	22	9	2	2	.....	.....	.....	.....	.....	.....	73
	30	.....	.....	2	8	4	4	2	.....	.....	.....	.....	.....	.....	20
	35	.....	.....	1	1	3	1	3	2	1	.....	.....	.....	.....	12
	40	.....	.....	.....	.....	.....	3	1	.....	.....	.....	.....	.....	.....	4
	45	.....	.....	1	.....	.....	.....	1	1	.....	.....	.....	.....	.....	3
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	.....	3
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	2
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS.		19	150	92	48	21	15	10	3	1	3	1	1	.....	364

Marriages by Denominations in the District of Sudbury 1916.

Town of Sudbury not included.

GROOMS.	BRIDES.												
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican	8	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	11
Presbyterian .....	.....	10	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	12
Methodist.....	1	.....	3	.....	.....	.....	1	.....	.....	.....	.....	.....	5
Roman Catholic.....	.....	.....	.....	50	.....	.....	.....	.....	.....	.....	.....	.....	50
Baptist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	14	.....	.....	.....	.....	.....	14
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	4
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	9	12	5	51	.....	.....	15	.....	.....	.....	4	.....	96

Licenses, 62.

Banns, 34.

Marriages by Ages in the District of Sudbury, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.	
	15	2	16	12	5	.....	.....	1	.....	.....	.....	.....	.....	.....	36
	20	.....	14	17	5	1	1	.....	.....	.....	.....	.....	.....	.....	38
	25	.....	3	7	3	2	.....	.....	.....	.....	.....	.....	.....	.....	15
	30	.....	.....	2	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	6
	35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS.	2	33	38	17	3	1	1	1	96

Marriages by Denominations in the District of Thunder Bay, 1916.

Cities of Fort William and Port Arthur not included.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican	3	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	4
Presbyterian .....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Methodist.....	.....	1	2	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	4
Roman Catholic	1	1	.....	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	8
Baptist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran	1	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	3
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Others Denominations.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	5	3	2	6	1	1	2	.....	.....	.....	.....	.....	.....	20

Licenses, 18,

Banns, 2.

Marriages by Ages in the District of Thunder Bay, 1916.

GROOMS.

	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
BRIDES.	15	1	6	1	1	1									10
	20			3	1										4
	25				2		1								3
	30														
	35				1										1
	40								1						1
	45											1			1
	50														
	55														
	60														
	65														
	70 & over														
	Age not stated.														
	TOTALS	1	6	4	5	1	1		1			1			20

Marriages by Denominations in the District of Timiskaming, 1916.

Town of Cobalt not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	17	10	6	2	2	.....	.....	.....	.....	.....	.....	.....	37
Presbyterian	4	34	4	1	1	.....	.....	.....	.....	.....	.....	.....	44
Methodist.....	.....	4	25	.....	1	.....	1	.....	.....	.....	.....	.....	31
Roman Catholic	4	2	1	51	1	.....	.....	.....	.....	.....	.....	.....	59
Baptist	2	.....	1	.....	5	.....	.....	.....	.....	.....	.....	.....	8
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	7	.....	.....	.....	.....	.....	7
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	1	.....	.....	.....	.....	2	.....	.....	.....	3
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	7	.....	8
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
TOTAL GROOMS	27	50	38	55	10	....	8	.....	2	.....	7	1	198

Licenses, 176.

Banns, 22.

Marriages by Ages in the District of Timiskaming, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	3	36	28	4	4	.....	.....	.....	.....	.....	.....	.....	.....	75
	20	1	27	23	12	2	.....	.....	.....	.....	.....	.....	.....	.....	70
	25	.....	3	12	12	6	.....	.....	.....	.....	.....	.....	.....	.....	33
	30	.....	.....	2	5	4	.....	.....	.....	1	.....	.....	.....	.....	12
	35	.....	.....	1	1	1	.....	1	.....	.....	.....	.....	.....	.....	4
	40	.....	.....	.....	.....	.....	.....	1	1	.....	.....	1	.....	.....	3
	45	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		4	66	71	34	17	.....	3	1	1	.....	1	.....	.....	198

Marriages by Denominations in the County of Victoria, 1916.

Town of Lindsay not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	4	5	3	1	.....	.....	.....	.....	.....	.....	.....	.....	13
Presbyterian .....	.....	17	6	.....	.....	.....	.....	.....	.....	.....	1	.....	24
Methodist	3	6	34	.....	1	.....	.....	.....	.....	.....	.....	.....	44
Roman Catholic .....	.....	1	1	6	.....	.....	.....	.....	.....	.....	.....	.....	8
Baptist	2	5	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	8
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Denominationnotstated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	9	34	45	7	1	.....	.....	.....	.....	.....	2	.....	98

Licenses, 92.

Banns, 6.

Marriages by Ages in the County of Victoria, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	1	6	7	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	16
	20	.....	18	21	6	2	1	.....	.....	.....	.....	.....	.....	.....	48
	25	.....	3	5	10	3	.....	.....	.....	.....	.....	.....	.....	.....	21
	30	.....	.....	1	3	1	.....	1	.....	.....	.....	.....	.....	.....	6
	35	.....	.....	.....	.....	.....	.....	1	2	.....	.....	.....	.....	.....	3
	40	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
	45	.....	.....	.....	.....	.....	.....	.....	2	1	.....	.....	.....	.....	3
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		1	27	34	21	6	1	3	4	1	.....	.....	.....	.....	98

Marriages by Denominations in the County of Waterloo, 1916.

Cities of Galt and Kitchener not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican.....	16	3	2	.....	.....	.....	3	.....	.....	.....	.....	.....	24
Presbyterian	2	26	4	.....	3	.....	4	.....	.....	.....	1	.....	40
Methodist .....	.....	4	16	.....	2	.....	3	1	.....	.....	1	.....	27
Roman Catholic	2	1	.....	33	.....	.....	1	.....	.....	.....	1	.....	38
Baptist	1	3	.....	.....	4	.....	.....	1	.....	.....	1	.....	10
Congregationalist .....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Lutheran	5	2	7	1	.....	.....	44	3	.....	.....	1	.....	63
Evangelical Association	1	1	1	.....	1	.....	.....	12	.....	.....	1	.....	17
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	1	.....	.....	.....	.....	2	2	.....	.....	47	.....	52
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	27	42	30	34	10	.....	57	19	.....	.....	53	.....	272

Licenses, 190.

Banns, 82.

Marriages by Ages in the County of Waterloo, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	.....	27	6	2	.....	1	.....	.....	.....	.....	.....	.....	.....	36
20	2	59	50	11	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	125
25	14	39	8	7	1	.....	.....	.....	.....	.....	.....	.....	.....	69
30	4	4	8	1	3	1	.....	.....	.....	.....	.....	.....	.....	21
35	1	2	5	2	1	.....	.....	1	.....	.....	.....	.....	12
40	1	1	1	.....	.....	.....	.....	3
45	1	.....	1	.....	.....	.....	.....	2
50
55	1	.....	.....	.....	2	.....	.....	.....	.....	3
60	1	.....	.....	1
65
70 & over
Age not stated.
TOTALS	2	104	100	31	17	7	2	2	3	3	1	.....	.....	.....	272

Marriages by Denominations in the County of Welland, 1916.
City of Niagara Falls and Town of Welland not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	42	5	6	2	1	1	2	.....	.....	.....	.....	.....	59
Presbyterian	8	15	3	2	1	.....	.....	.....	.....	.....	1	.....	30
Methodist	6	7	36	2	2	1	2	1	.....	.....	3	.....	60
Roman Catholic	8	3	3	32	1	.....	2	.....	.....	.....	3	.....	52
Baptist	2	1	2	.....	7	.....	.....	.....	.....	.....	.....	.....	12
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	2	.....	.....	12	.....	.....	.....	2	.....	16
Evangelical Association .....	.....	1	2	.....	.....	.....	.....	1	.....	.....	.....	.....	4
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	2	2	1	.....	.....	.....	.....	.....	.....	19	.....	24
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	3
TOTAL GROOMS	66	34	34	41	12	2	18	2	.....	.....	28	3	260

Licenses, 241.

Banns, 19.

Marriages by Ages in the County of Welland, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & ov'r	Not stated	TOTAL
	15	6	50	13	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	70
	20	.....	52	36	6	2	3	.....	1	.....	.....	.....	.....	.....	100
	25	.....	9	22	10	6	2	.....	.....	.....	.....	.....	.....	.....	49
	30	.....	1	6	6	8	1	2	.....	.....	.....	.....	.....	.....	24
	35	.....	.....	2	.....	1	2	.....	.....	1	.....	.....	.....	.....	6
	40	.....	.....	.....	2	2	1	.....	2	1	.....	.....	.....	.....	8
	45	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	2
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		6	112	79	24	19	9	4	5	2	.....	.....	.....	.....	260

Marriages by Denominations in the County of Wellington, 1916.

City of Guelph not included.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican.....	7	8	5	3	1	.....	.....	.....	.....	.....	.....	.....	.....	24
Presbyterian	10	60	10	1	3	1	1	.....	.....	.....	.....	2	.....	89
Methodist.....	3	22	43	.....	1	1	1	.....	.....	.....	.....	.....	.....	71
Roman Catholic .....	.....	.....	1	19	.....	.....	.....	.....	.....	.....	.....	.....	.....	20
Baptist.....	1	2	5	.....	4	.....	.....	.....	.....	.....	.....	1	.....	13
Congregationalist.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
Lutheran .....	.....	2	1	.....	.....	.....	4	.....	.....	.....	.....	.....	.....	7
Evangelical Association .....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	3	1	.....	.....	.....	.....	.....	.....	.....	.....	10	.....	14
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	21	101	66	23	9	2	6	.....	.....	.....	.....	13	.....	241

Licenses, 220.

Banns, 21.

Marriages by Ages in the County of Wellington, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	3	27	5	2	1	.....	.....	.....	.....	.....	.....	.....	.....	38
	20	.....	40	40	14	1	.....	1	.....	.....	.....	.....	.....	.....	96
	25	.....	10	28	16	6	3	1	1	.....	.....	.....	.....	.....	65
	30	.....	1	6	10	4	4	.....	.....	.....	.....	.....	.....	.....	25
	35	.....	.....	.....	1	3	2	2	1	.....	.....	.....	.....	.....	9
	40	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	1	.....	.....	3
	45	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	2
	50	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	2
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	3	78	79	43	15	9	6	2	4	1	1

Marriages by Denominations in the County of Wentworth, 1916.

City of Hamilton not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican.....	15	5	5	1	1	.....	.....	.....	.....	.....	.....	.....	27
Presbyterian	6	17	9	.....	1	1	.....	.....	.....	.....	.....	.....	34
Methodist.....	5	13	47	.....	4	.....	.....	.....	.....	.....	.....	.....	69
Roman Catholic.....	.....	1	1	3	.....	.....	.....	.....	.....	.....	.....	.....	5
Baptist .....	.....	3	3	1	2	.....	.....	.....	.....	.....	.....	.....	9
Congregationalist.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	1	.....	.....	.....	.....	.....	.....	3	.....	.....	4
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	26	40	66	5	8	1	.....	.....	.....	3	1	.....	150

Licenses, 146.

Banns, 4.

Marriages by Ages in the County of Wentworth, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	3	19	8	1	1	.....	.....	.....	.....	.....	.....	.....	.....	32
	20	1	29	15	3	1	.....	.....	.....	.....	.....	.....	.....	.....	49
	25	.....	10	24	7	3	1	.....	.....	.....	.....	.....	.....	.....	45
	30	.....	1	2	7	2	1	.....	.....	1	.....	.....	.....	.....	14
	35	.....	.....	.....	.....	2	1	.....	.....	.....	.....	.....	.....	.....	3
	40	.....	.....	.....	.....	.....	1	.....	1	1	.....	.....	.....	.....	3
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	1	.....	1	.....	1	.....	.....	.....	3
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		4	59	49	18	9	5	.....	2	2	2	.....	.....	.....	150

Marriages by Denominations in the County of York, 1916.

City of Toronto not included.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	66	9	22	.....	3	.....	.....	.....	.....	.....	3	.....	103
Presbyterian	12	47	12	1	2	1	1	.....	.....	.....	2	.....	78
Methodist.....	14	21	101	1	3	.....	.....	.....	.....	.....	1	.....	144
Roman Catholic	1	2	.....	10	.....	.....	.....	.....	.....	.....	.....	.....	13
Baptist	2	3	4	.....	9	1	.....	.....	.....	.....	.....	1	20
Congregationalist.....	1	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....	3
Lutheran	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	2
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Salvation Army.....	.....	.....	1	.....	.....	.....	.....	.....	.....	3	.....	.....	4
Other Denominations..	3	.....	2	.....	1	.....	.....	.....	.....	.....	22	.....	28
Denomination notstated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2
TOTAL GROOMS.....	100	85	143	12	18	2	3	.....	1	3	28	3	398

Licenses, 371

Banns, 27.

Marriages by Ages in the County of York, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	5	35	17	2	1	.....	.....	.....	.....	.....	.....	.....	.....	60
20	87	70	13	3	.....	.....	.....	1	.....	.....	.....	.....	174
25	9	54	24	7	3	1	.....	.....	.....	.....	.....	.....	98
30	1	6	11	9	3	1	1	.....	1	.....	.....	.....	33
35	1	2	4	3	1	1	2	1	.....	.....	.....	.....	15
40	1	3	2	2	1	.....	.....	.....	.....	.....	9
45	2	.....	.....	1	1	1	.....	.....	.....	.....	5
50	2	.....	1	1	.....	.....	4
55
60
65
70 & over
Age not stated.
TOTALS	5	133	149	57	26	9	6	7	3	2	1	.....	.....	398

Marriages by Denominations in the Cities of Ontario, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations	Denomination not stated	TOTAL BRIDES.
Anglican		1,962	431	369	120	108	27	10	1	.....	6	25	.....	3,065
Presbyterian		341	1,403	301	60	92	12	16	.....	1	3	18	3	2,250
Methodist.....		334	353	1,511	67	126	22	18	3	3	4	21	4	2,466
Roman Catholic		142	93	81	1,500	17	6	12	1	1	..	44	1	1,898
Baptist		123	135	157	33	335	11	13	1	... ..	1	10	1	820
Congregationalist.....		21	17	14	1	10	54	1	1	.....	2	1	.....	122
Lutheran		17	19	19	11	11	3	152	1	1	.....	5	.....	239
Evangelical Association		2	1	2	.....	.....	.....	.....	15	.....	.....	.....	.....	20
Hebrew		1	.....	.....	2	1	.....	.....	.....	401	.....	.....	.....	405
Salvation Army.....		1	4	9	2	1	.....	2	...	.....	51	.....	.....	70
Other Denominations..		21	19	30	29	7	1	9	1	.....	.....	322	.....	439
Denomination not stated		5	5
TOTAL GROOMS		2,971	2,475	2,493	1,825	708	136	233	24	407	67	446	14	11,799

Licenses, 10,477.

Banns, 1,322.

Marriages by Ages in the Cities of Ontario, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	209	1,359	423	70	24	8	3	1	.....	.....	.....	.....	.....	2,097
	20	56	2,458	1,699	456	123	48	12	3	.....	2	...	.....	.....	4,857
	25	1	343	1,309	668	245	65	26	7	5	.....	.....	.....	.....	2,669
	30	.....	34	249	352	217	101	43	15	10	2	.....	.....	.....	1,023
	35	.....	6	37	129	173	96	53	24	14	5	3	2	.....	542
	40	.....	3	7	28	55	76	50	37	17	9	4	2	.....	288
	45	.....	1	.....	3	8	32	42	35	26	15	12	1	.....	175
	50	.....	.....	.....	1	.....	6	6	23	16	10	5	3	.....	70
	55	.....	.....	.....	.....	.....	1	1	6	9	14	3	4	.....	38
	60	.....	.....	.....	.....	.....	.....	1	2	.....	6	10	8	.....	27
	65	.....	.....	.....	.....	.....	.....	.....	.....	1	1	2	.....	1	5
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	.....	8
TOTALS		266	4,204	3,724	1,707	845	433	237	153	98	64	39	28	1	11,799

Marriages by Denominations in the City of Belleville, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations	Denomination not stated	
Anglican	14	5	6	5	.....	.....	.....	.....	.....	.....	.....	.....	30
Presbyterian	3	13	6	.....	1	.....	.....	.....	.....	.....	.....	.....	23
Methodist.....	13	4	44	1	.....	.....	.....	.....	.....	.....	.....	.....	62
Roman Catholic .....	.....	1	1	11	.....	.....	.....	.....	.....	.....	.....	.....	13
Baptist .....	.....	.....	3	1	1	.....	.....	.....	.....	.....	.....	.....	5
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Other Denominations..	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	32	23	61	18	2	.....	.....	.....	.....	.....	.....	.....	136

Licenses, 125.

Banns, 11.

Marriages by Ages in the City of Belleville, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	4	21	9	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	35
20	26	18	4	3	.....	.....	.....	.....	.....	.....	.....	.....	51
25	3	15	2	2	2	1	1	.....	.....	.....	.....	.....	26
30	2	4	.....	.....	1	.....	.....	.....	.....	.....	7
35	3	1	.....	2	.....	.....	.....	.....	.....	.....	6
40	2	1	1	1	.....	.....	.....	.....	.....	.....	5
45	1	1	2	.....	.....	.....	.....	.....	1
50
55	1	.....	.....	.....	.....	.....	1
60	1	.....	.....	1
65
70 & over
Age not stated.
TOTALS	4	50	42	13	11	5	5	5	.....	.....	.....	1	.....	.....	136

Marriages by Denominations in the City of Brantford, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican.....	40	3	7	5	6	1	.....	.....	.....	.....	1	.....	63
Presbyterian	2	18	4	.....	4	.....	.....	.....	.....	.....	.....	.....	28
Methodist.....	12	6	44	1	11	1	.....	.....	.....	.....	.....	.....	75
Roman Catholic	2	.....	.....	25	1	1	.....	1	.....	.....	2	.....	32
Baptist.....	5	4	15	4	43	.....	1	.....	.....	.....	.....	.....	72
Congregationalist.....	.....	3	1	.....	1	3	.....	.....	.....	.....	.....	.....	8
Lutheran .....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	3
Other Denominations..	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	.....	6
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	62	34	71	35	67	6	1	1	1	3	8	.....	289

Licenses, 264.

Banns, 25.

Marriages by Ages in the City of Brantford, 1916:

GROOMS.

	AGE.	BRIDES.													TOTAL
		15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	
	15	11	50	8	4	1	.....	.....	.....	.....	.....	.....	.....	.....	74
	20	2	52	40	14	2	1	.....	.....	.....	.....	.....	.....	.....	111
	25	.....	7	25	21	6	1	1	.....	.....	.....	.....	.....	.....	61
	30	.....	1	6	7	4	1	1	.....	.....	.....	.....	.....	.....	20
	35	.....	.....	.....	2	4	3	.....	.....	.....	.....	.....	.....	.....	9
	40	.....	.....	1	.....	.....	3	.....	1	1	1	.....	.....	.....	7
	45	.....	.....	.....	.....	.....	1	3	.....	.....	.....	.....	.....	.....	4
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	2
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	13	110	80	48	17	10	5	2	1	1	1	1	.....	289

Marriages by Denominations in the City of Chatham, 1916.

GROOMS.	BRIDES.											
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.
Anglican.....	22	3	6	2	2	.....	.....	.....	.....	.....	.....	.....
Presbyterian	5	14	4	.....	2	.....	.....	.....	.....	.....	.....	.....
Methodist.....	7	7	49	1	5	.....	.....	.....	.....	.....	1	.....
Roman Catholic	5	2	4	23	2	.....	.....	.....	.....	.....	1	.....
Baptist	3	3	7	.....	6	.....	.....	.....	.....	.....	.....	.....
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations ..	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	5	.....
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	42	29	71	26	17	.....	.....	.....	.....	.....	7	.....

Licenses, 177.

Banns, 15.

Marriages by Ages in the City of Chatham, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	8	29	11	1	1	.....	.....	.....	.....	.....	.....	.....	.....	50
	20	.....	56	26	7	2	.....	1	.....	.....	.....	.....	.....	.....	92
	25	.....	2	9	6	2	.....	.....	.....	.....	.....	.....	.....	.....	19
	30	.....	.....	2	5	5	2	.....	.....	.....	.....	.....	.....	.....	14
	35	.....	.....	.....	.....	3	4	.....	.....	1	.....	.....	.....	.....	8
	40	.....	1	1	1	1	.....	1	.....	.....	.....	.....	.....	.....	5
	45	.....	.....	.....	.....	.....	1	.....	2	.....	.....	.....	.....	.....	3
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		4	88	49	20	14	7	2	2	1	.....	1	.....	.....	192

Marriages by Denominations in the City of Fort William, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican	25	3	4	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	33
Presbyterian	2	24	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	29
Methodist.....	2	4	14	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	22
Roman Catholic	6	3	.....	40	1	.....	.....	.....	.....	.....	.....	1	.....	51
Baptist.....	.....	3	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	.....	8
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran	1	2	.....	.....	.....	.....	12	.....	.....	.....	.....	.....	.....	15
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	.....	.....	4
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Other Denominations..	1	.....	1	2	.....	.....	.....	.....	.....	.....	.....	35	.....	39
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	37	39	21	44	8	.....	12	.....	4	1	36	.....	.....	202

Licenses, 144.

Banns, 58.

Marriages by Ages in the City of Fort William, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	2	38	21	1	1	.....	.....	.....	.....	.....	.....	.....	.....	63
	20	.....	31	29	15	5	2	1	.....	.....	.....	.....	.....	.....	82
	25	.....	2	11	15	3	1	.....	.....	.....	.....	.....	.....	.....	32
	30	.....	.....	4	1	3	1	1	.....	.....	.....	.....	.....	.....	10
	35	.....	1	1	4	1	.....	2	.....	.....	.....	.....	.....	.....	9
	40	.....	.....	.....	.....	3	1	.....	.....	.....	.....	.....	.....	.....	4
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	2	72	65	36	16	5	4	.....	2	.....	.....	.....	.....	202

Marriages by Denominations in the City of Galt, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	27	3	4	1	3	.....	.....	.....	.....	.....	.....	.....	38
Presbyterian	3	29	4	.....	1	.....	.....	.....	.....	.....	.....	1	8
Methodist .....	.....	4	16	.....	.....	.....	1	.....	.....	.....	.....	.....	21
Roman Catholic .....	.....	.....	1	3	.....	.....	.....	.....	.....	.....	.....	.....	4
Baptist	1	1	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	5
Congregationalist.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Lutheran .....	.....	1	.....	.....	1	.....	1	.....	.....	.....	.....	.....	3
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Salvation Army.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1	.....	.....	2
Other Denominations..	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	2
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
TOTAL GROOMS.....	31	38	26	4	10	.....	2	.....	1	1	1	2	116

Licenses, 108.

Banns, 8.

Marriages by Ages in the City of Galt, 1916.

GROOMS.

BRIDES.	Age.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	5	6	4	1	.....	1	.....	.....	.....	.....	.....	.....	.....	17
	20	2	23	22	4	.....	1	.....	.....	.....	.....	.....	.....	.....	52
	25	.....	5	14	8	2	.....	.....	.....	.....	.....	.....	.....	.....	29
	30	.....	.....	1	1	4	1	1	1	.....	.....	.....	.....	.....	9
	35	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
	40	.....	.....	.....	.....	1	.....	2	1	.....	.....	.....	.....	.....	4
	45	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	2
	50	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		7	34	41	14	7	5	4	4	.....	.....	.....	.....	.....	116

Marriages by Denominations in the City of Guelph, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Others Denominations.	Denomination not stated.	
Anglican	19	3	4	2	1	.....	.....	.....	.....	.....	.....	.....	29
Presbyterian.....	7	30	4	3	2	.....	1	.....	.....	.....	.....	.....	47
Methodist	4	5	29	.....	1	1	.....	.....	.....	.....	1	.....	41
Roman Catholic .....	.....	2	.....	22	.....	.....	.....	.....	.....	.....	1	.....	25
Baptist	1	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	3
Congregationalist.....	.....	1	2	.....	.....	1	.....	.....	.....	.....	.....	.....	4
Lutheran	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	32	41	42	27	5	2	1	.....	.....	.....	2	.....	152

Licenses, 134.

Banns, 18.

Marriages by Ages in the City of Guelph, 1916.

GROOMS.															
BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	.....	15	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16
	20	2	34	25	9	1	2	1	.....	.....	.....	.....	.....	.....	74
	25	.....	3	21	9	1	.....	2	.....	.....	.....	.....	.....	.....	36
	30	.....	.....	.....	4	3	.....	.....	.....	.....	.....	.....	.....	.....	7
	35	.....	.....	.....	2	2	.....	3	.....	.....	.....	.....	.....	.....	7
	40	.....	.....	.....	.....	.....	2	2	.....	1	.....	.....	.....	.....	5
	45	.....	.....	.....	.....	1	1	.....	.....	.....	1	.....	.....	.....	3
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	1	.....	.....	4
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		2	52	47	24	8	5	8	.....	1	4	1	.....	.....	152

Marriages by Denominations in the City of Hamilton, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglica.l.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denomina-tions.	Denomination not stated.	
Anglican	202	40	40	13	20	2	1	.....	.....	.....	4	.....	322
Presbyterian	41	127	38	4	9	1	2	.....	.....	.....	1	.....	223
Methodist.....	34	28	144	7	7	3	1	2	.....	.....	2	.....	228
Roman Catholic.....	11	13	14	142	.....	.....	.....	.....	.....	.....	5	.....	185
Baptist	9	15	19	3	39	2	2	.....	.....	1	1	.....	91
Congregationalist.....	4	1	2	.....	2	6	.....	.....	.....	.....	.....	.....	15
Lutheran	1	1	2	1	.....	.....	4	.....	.....	.....	.....	.....	9
Evangelical Association	1	.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....	3
Hebrew .....	.....	.....	.....	2	.....	.....	.....	.....	27	.....	.....	.....	29
Salvation Army.....	.....	1	.....	1	.....	.....	.....	.....	.....	5	.....	.....	7
Other Denominations..	2	1	1	1	1	.....	.....	.....	.....	.....	29	.....	35
Denominationnotstated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS,....	305	227	261	174	78	14	10	3	27	6	42	.....	1,147

Licenses, 1,014.

Banns, 133.

Marriages by Ages in the City of Hamilton, 1916:

GROOMS.															
BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	19	170	32	4	2	1	.....	.....	.....	.....	.....	.....	.....	228
	20	3	235	172	33	15	2	2	.....	.....	.....	.....	.....	.....	462
	25	.....	39	117	67	21	4	.....	2	.....	.....	.....	.....	.....	250
	30	.....	8	29	28	19	9	6	3	.....	.....	.....	.....	.....	102
	35	.....	.....	4	8	19	5	5	5	1	1	.....	.....	.....	48
	40	.....	1	.....	2	6	9	4	3	1	.....	1	.....	.....	27
	45	.....	1	.....	1	1	2	8	1	2	.....	1	.....	.....	17
	50	.....	.....	.....	.....	.....	2	2	3	.....	.....	.....	.....	.....	7
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	1	.....	3
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	2
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		22	454	354	143	83	34	27	17	4	3	4	2	.....	1,147

Marriages by Denominations in the City of Kingston, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated	
Anglican	42	3	11	3	2	.....	.....	.....	.....	.....	.....	.....	61
Presbyterian	5	24	6	.....	1	.....	.....	.....	.....	.....	1	.....	37
Methodist.....	6	11	78	3	1	1	.....	.....	.....	.....	.....	.....	100
Roman Catholic	1	3	3	34	1	.....	.....	.....	.....	.....	2	.....	44
Baptist	1	1	2	.....	3	2	.....	.....	.....	.....	.....	.....	9
Congregationalist.....	1	.....	2	.....	.....	1	.....	.....	.....	1	.....	.....	5
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	.....	3
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	4
Other Denominations..	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	56	42	103	40	8	4	.....	.....	3	5	3	.....	264

Licenses, 249.

Banns, 15.

Marriages by Ages in the City of Kingston, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	7	47	18	5	1	1	.....	.....	.....	.....	.....	.....	.....	79
	20	3	61	30	5	3	1	.....	.....	.....	.....	.....	.....	.....	103
	25	.....	7	23	9	5	1	2	1	.....	.....	.....	.....	.....	48
	30	.....	.....	.....	7	4	.....	1	1	1	.....	.....	.....	.....	14
	35	.....	.....	1	2	5	1	.....	.....	.....	.....	.....	.....	.....	9
	40	.....	.....	.....	.....	.....	1	1	3	2	1	.....	.....	.....	8
	45	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		10	115	72	28	18	5	4	5	4	2	.....	1	.....	264

Marriages by Denominations in the City of Kitchener, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican	6	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9
Presbyterian	1	8	1	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	12
Methodist.....	.....	1	9	.....	1	2	1	.....	.....	1	.....	.....	.....	15
Roman Catholic	1	1	.....	.....	41	.....	.....	2	.....	.....	.....	1	.....	46
Baptist	1	.....	.....	.....	1	3	.....	2	1	.....	.....	.....	.....	8
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran	1	2	2	4	3	2	42	.....	.....	.....	.....	5	.....	61
Evangelical Association	.....	.....	1	.....	.....	.....	.....	.....	9	.....	.....	.....	.....	10
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	.....	4
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	1	2	1	1	.....	4	.....	.....	.....	.....	10	.....	19
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	10	14	17	47	8	4	53	10	4	1	16	.....	.....	184

Licenses, 143.

Banns, 41.

Marriages by Ages in the City of Kitchener, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	7	21	6	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	35
	20	1	61	19	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	86
	25	.....	7	18	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	35
	30	.....	.....	5	6	2	2	.....	.....	.....	.....	.....	.....	.....	15
	35	.....	.....	2	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	4
	40	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	45	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	1	.....	2	.....	1	.....	4
	55	.....	.....	.....	.....	.....	.....	.....	.....	2	1	.....	.....	.....	3
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	8	89	50	21	4	2	1	3	2	3	.....	1	.....	184

Marriages by Denominations in the City of London, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated	
Anglican	100	28	19	3	10	1	.....	.....	.....	2	.....	.....	163
Presbyterian	21	73	18	1	4	.....	.....	.....	.....	1	2	.....	120
Methodist.....	28	30	96	2	13	2	1	.....	.....	.....	2	.....	174
Roman Catholic.....	5	5	2	48	.....	1	1	.....	.....	.....	1	.....	63
Baptist	11	11	20	4	30	.....	.....	.....	.....	.....	1	.....	77
Congregationalist.....	.....	2	1	.....	2	1	.....	.....	.....	1	.....	.....	7
Lutheran	1	2	1	1	.....	.....	1	.....	.....	.....	.....	.....	6
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Salvation Army.....	.....	1	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	4
Other Denominations..	2	1	1	1	.....	.....	.....	.....	.....	.....	10	.....	15
Denominationnotstated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
TOTAL GROOMS	163	153	158	60	59	5	3	.....	1	7	16	1	631

Licenses, 590.

Banns, 41.

Marriages by Ages in the City of London, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	9	82	21	6	1	1	.....	.....	.....	.....	.....	.....	.....	120
	20	4	129	85	20	8	1	.....	.....	.....	.....	.....	.....	.....	247
	25	.....	12	74	39	10	4	4	.....	.....	.....	.....	.....	.....	143
	30	.....	5	12	23	8	4	3	.....	2	.....	.....	.....	.....	57
	35	.....	1	3	6	10	9	1	3	1	1	.....	.....	.....	35
	40	.....	.....	.....	1	3	3	1	.....	.....	1	1	1	.....	11
	45	.....	.....	.....	1	1	2	1	1	1	2	1	.....	.....	10
	50	.....	.....	.....	.....	.....	.....	1	1	1	.....	.....	.....	.....	3
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	2
	60	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1	.....	.....	2
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		13	229	195	96	41	24	12	5	5	6	3	2	.....	631

Marriages by Denominations in the City of Niagara Falls, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Donominations.	Denomination not stated.	
Anglican	43	12	3	2	3	.....	1	.....	.....	.....	2	.....	66
Presbyterian	7	25	8	4	5	.....	1	.....	1	.....	2	.....	53
Methodist.....	1	7	40	2	6	1	.....	.....	.....	.....	2	.....	59
Roman Catholic	4	1	3	24	2	.....	1	.....	1	.....	2	.....	38
Baptist	2	11	5	1	16	2	1	.....	.....	.....	1	.....	39
Congregationalist.....	1	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	.....	4
Lutheran .....	.....	1	2	.....	4	.....	10	.....	.....	.....	.....	.....	17
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
Other Dominations....	1	.....	1	2	.....	.....	.....	.....	.....	.....	12	.....	16
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	59	57	62	35	36	6	14	.....	3	1	21	.....	294

Licenses, 289.

Banns, 5.

Marriages by Ages in the City of Niagara Falls, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	6	33	8	2	1	.....	.....	.....	.....	.....	.....	.....	.....	50
	20	1	59	39	9	4	1	1	.....	.....	.....	.....	.....	.....	114
	25	.....	6	22	12	8	6	2	1	.....	.....	.....	.....	.....	57
	30	.....	1	6	8	8	3	1	.....	2	.....	.....	.....	.....	29
	35	.....	.....	1	3	5	1	2	.....	1	.....	.....	.....	.....	13
	40	.....	.....	.....	1	3	2	2	4	1	1	1	.....	.....	15
	45	.....	.....	.....	.....	.....	1	3	.....	3	.....	1	.....	.....	8
	50	.....	.....	.....	.....	.....	.....	1	2	2	.....	.....	1	.....	6
	55	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		7	99	76	35	29	14	12	7	10	2	2	1	.....	294

Marriages by Denominations in the City of Ottawa, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	123	37	21	7	7	4	1	.....	.....	.....	1	.....	201
Presbyterian	33	138	13	11	7	1	1	.....	.....	.....	.....	.....	204
Methodist.....	15	25	62	7	3	.....	1	.....	.....	.....	2	.....	115
Roman Catholic.....	20	14	13	373	.....	.....	2	.....	.....	.....	3	.....	425
Baptist	8	8	3	3	14	.....	.....	.....	.....	.....	.....	.....	58
Congregationalist.....	.....	2	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	4
Lutheran	3	1	1	.....	1	.....	9	.....	.....	.....	.....	.....	15
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew.....	.....	.....	.....	.....	.....	.....	.....	.....	20	.....	.....	.....	20
Salvation Army.....	.....	.....	1	.....	.....	.....	.....	.....	.....	3	.....	.....	4
Other Denominations..	1	2	1	3	.....	.....	.....	1	.....	.....	22	.....	30
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
TOTAL GROOMS	203	227	115	404	32	7	16	1	20	3	28	1	1,057

Licenses, 831.

Banns, 226.

Marriages by Ages in the City of Ottawa, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	19	106	32	8	2	.....	.....	.....	.....	.....	.....	.....	.....	167
	20	4	234	158	52	11	5	1	.....	.....	1	.....	.....	.....	466
	25	1	28	90	40	29	9	3	1	1	.....	.....	.....	.....	202
	30	.....	5	31	36	22	15	3	2	1	2	.....	.....	.....	117
	35	.....	.....	4	12	12	8	5	1	.....	2	.....	.....	.....	44
	40	.....	.....	2	3	7	11	2	3	3	3	.....	.....	.....	34
	45	.....	.....	.....	.....	1	2	3	3	2	2	.....	.....	.....	13
	50	.....	.....	.....	1	.....	1	.....	1	.....	1	.....	.....	.....	4
	55	.....	.....	.....	.....	.....	.....	.....	2	.....	2	1	1	.....	6
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	3
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	24	373	317	152	84	51	17	13	7	13	4	2	.....	1,057

Marriages by Denominations in the City of Peterboro', 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican		30	8	12	2	.....	.....	.....	.....	.....	.....	.....	.....	52
Presbyterian		6	23	5	.....	1	.....	.....	.....	.....	.....	.....	.....	35
Methodist		8	16	44	2	1	.....	.....	.....	.....	1	.....	.....	72
Roman Catholic		2	1	1	29	.....	.....	.....	.....	.....	.....	.....	.....	33
Baptist		2	2	7	.....	5	.....	.....	.....	.....	.....	.....	.....	16
Congregationalist.....	
Lutheran
Evangelical Association
Hebrew
Salvation Army.....		1	.....	.....	2	.....	.....	3
Other Denominations..		1	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	3
Denomination not stated	
TOTAL GROOMS		48	51	69	33	7	.....	1	.....	.....	3	2	.....	214

Licenses, 186.

Banns, 28.

Marriages by Ages in the City of Peterboro', 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	3	26	5	2	2	1	.....	.....	.....	.....	.....	.....	.....	39
	20	1	43	31	9	2	2	.....	.....	.....	.....	.....	.....	.....	88
	25	.....	9	21	7	6	.....	.....	.....	.....	.....	.....	.....	.....	43
	30	.....	.....	2	8	4	1	.....	.....	1	.....	.....	.....	.....	16
	35	.....	.....	1	1	9	.....	1	2	.....	.....	.....	.....	.....	14
	40	.....	.....	.....	1	.....	2	1	1	.....	.....	.....	.....	.....	5
	45	.....	.....	.....	.....	.....	.....	1	1	3	.....	.....	.....	.....	5
	50	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	2
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	4	78	60	28	23	6	3	4	6	.....	.....	2	.....	211

Marriages by Denominations in the City of Port Arthur, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	10	7	1	1	.....	.....	.....	.....	.....	.....	.....	.....	19
Presbyterian	5	25	1	2	2	1	.....	.....	.....	.....	.....	.....	36
Methodist.....	1	4	7	1	1	.....	.....	.....	.....	.....	.....	.....	14
Roman Catholic.....	2	.....	.....	18	.....	.....	1	.....	.....	.....	.....	.....	21
Baptist.....	.....	2	2	.....	8	.....	1	.....	.....	.....	.....	.....	13
Congregationalist .....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Lutheran .....	.....	.....	.....	.....	.....	.....	30	.....	.....	.....	.....	.....	30
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army .....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
Other Denominations..	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	.....	7
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	19	38	11	23	12	1	32	.....	.....	.....	6	.....	142

Licenses, 138.

Banns, 4.

Marriages by Ages in the City of Port Arthur, 1916.

GROOMS.

	AGE.	BRIDES.													TOTAL
		15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	
	15	1	19	12	2	1	.....	.....	.....	.....	.....	.....	.....	.....	35
	20	.....	21	24	6	4	1	.....	.....	.....	.....	.....	.....	.....	56
	25	.....	2	14	7	2	1	.....	.....	.....	.....	.....	.....	.....	26
	30	.....	.....	4	7	3	.....	.....	.....	1	.....	.....	.....	.....	15
	35	.....	.....	1	.....	2	2	1	.....	.....	.....	.....	.....	.....	6
	40	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	2
	45	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	1	42	55	22	13	6	1	.....	1	.....	.....	.....	1	142

Marriages by Denominations in the City of St. Catharines, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations	Denomination not stated	
Anglican	56	11	14	3	3	2	1	.....	.....	.....	1	.....	91
Presbyterian	6	20	4	.....	.....	.....	1	.....	.....	.....	.....	.....	31
Methodist.....	7	7	36	1	5	.....	1	.....	.....	.....	.....	.....	57
Roman Catholic	3	1	.....	34	.....	.....	.....	.....	.....	.....	1	.....	39
Baptist	4	3	5	2	7	.....	1	.....	.....	.....	.....	.....	22
Congregationalist.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
Lutheran .....	.....	2	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	3
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Salvation Army.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Other Denominations..	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	4
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	76	45	60	40	15	3	5	.....	1	.....	5	.....	250

Licenses, 213.

Banns, 37.

Marriages by Ages in the City of St. Catharines, 1916.

GROOMS.															
BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	5	41	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	52
	20	2	46	30	11	3	2	.....	.....	.....	.....	.....	.....	.....	94
	25	.....	9	26	14	2	1	.....	.....	.....	.....	.....	.....	.....	52
	30	.....	.....	10	8	5	.....	1	.....	1	.....	.....	.....	.....	25
	35	.....	.....	3	3	2	.....	2	2	.....	.....	.....	.....	.....	12
	40	.....	.....	.....	1	2	2	2	2	.....	.....	.....	.....	.....	9
	45	.....	.....	.....	.....	.....	.....	.....	1	1	1	.....	.....	.....	3
	50	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	2
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		7	96	75	37	14	5	5	5	4	1	.....	1	.....	250

Marriages by Denominations in the City of St. Thomas, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations	Denomination not stated	
Anglican	20	3	7	2	2	.....	.....	.....	.....	1	.....	.....	35
Presbyterian.	1	12	8	.....	2	.....	1	.....	.....	.....	1	.....	25
Methodist.....	5	10	38	1	2	.....	1	.....	.....	1	.....	.....	58
Roman Catholic .....	.....	1	4	7	.....	.....	.....	.....	.....	.....	.....	.....	12
Baptist	3	2	7	1	10	.....	.....	.....	.....	.....	.....	.....	23
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Salvation Army .....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Other Denominations..	1	1	1	.....	.....	.....	.....	.....	.....	.....	2	.....	5
Denomination not stated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	30	30	66	11	16	.....	2	.....	1	2	3	.....	161

Licenses, 153.

Banns, 8.

Marriages by Ages in the City of St. Thomas, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	3	15	7	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	26
	20	1	39	20	6	2	.....	.....	1	.....	.....	.....	.....	.....	69
	25	.....	5	18	5	2	2	.....	.....	.....	.....	.....	.....	.....	32
	30	.....	.....	2	4	3	1	1	.....	.....	.....	.....	.....	.....	11
	35	.....	.....	.....	1	4	3	1	.....	.....	.....	.....	.....	.....	9
	40	.....	.....	1	.....	.....	1	3	2	.....	.....	.....	.....	.....	7
	45	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	2
	50	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	60	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	2	.....	.....	3
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		4	59	48	17	11	7	5	4	4	.....	2	.....	....	161

Marriages by Denominations in the City of Sarnia, 1916.

GROOMS	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations	Denomination not stated.	
Anglican	20	1	11	1	3	.....	.....	.....	.....	.....	.....	.....	36
Presbyterian	1	22	10	1	1	.....	.....	.....	.....	.....	.....	.....	35
Methodist.....	3	12	43	2	3	.....	.....	.....	.....	.....	.....	.....	63
Roman Catholic.....	1	.....	1	7	.....	.....	.....	.....	.....	.....	1	.....	10
Baptist	2	3	4	1	4	.....	.....	.....	.....	.....	.....	.....	14
Congregationalist	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Lutheran	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Salvation Army .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	1	.....	1	.....	.....	.....	.....	.....	.....	2	.....	4
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	29	39	69	13	11	.....	.....	.....	1	.....	3	.....	165

Licenses, 161.

Banns, 4.

Marriages by Ages in the City of Sarnia, 1916.

GROOMS.

	AGE.	BRIDES.													TOTAL.
		15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	
	15	3	20	4	5	.....	1	.....	.....	.....	.....	.....	.....	.....	33
	20	1	29	28	6	.....	1	1	.....	.....	.....	.....	.....	.....	66
	25	.....	4	17	9	5	1	.....	.....	1	.....	.....	.....	.....	37
	30	.....	.....	1	5	2	1	1	1	.....	.....	.....	.....	.....	11
	35	.....	.....	.....	1	3	.....	3	1	.....	.....	1	.....	.....	9
	40	.....	.....	.....	.....	.....	.....	3	1	.....	.....	.....	.....	.....	4
	45	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	4	53	50	26	10	4	9	4	2	2	1	.....	.....	165

Marriages by Denominations in the City of Sault Ste. Marie, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	17	6	4	4	1	.....	.....	.....	.....	.....	.....	.....	32
Presbyterian	1	21	4	1	.....	.....	1	.....	.....	.....	1	.....	29
Methodist.....	3	7	13	.....	.....	.....	.....	.....	.....	.....	.....	.....	23
Roman Catholic .....	.....	2	1	34	.....	.....	.....	.....	.....	.....	.....	.....	37
Baptist	1	.....	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	4
Congregationalist.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
Lutheran .....	.....	.....	.....	.....	.....	.....	5	.....	.....	.....	.....	.....	5
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	23	36	22	40	4	.....	6	.....	1	.....	2	.....	134

Licenses, 110.

Banns, 24.

Marriages by Ages in City of Sault Ste. Marie, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	2	20	9	4	1	.....	.....	.....	.....	.....	.....	.....	.....	36
	20	1	25	19	6	.....	1	.....	.....	.....	.....	.....	.....	.....	52
	25	.....	4	12	4	2	1	.....	.....	.....	.....	.....	.....	.....	23
	30	.....	.....	3	3	3	2	.....	.....	.....	.....	.....	.....	.....	11
	35	.....	.....	.....	2	2	2	.....	.....	.....	1	.....	.....	.....	7
	40	.....	.....	.....	.....	1	1	1	.....	.....	.....	.....	.....	.....	3
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		3	49	43	19	9	7	1	.....	.....	2	.....	1	.....	134

Marriages by Denominations in the City of Stratford, 1916.

GROOMS	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican	21	5	7	.....	1	.....	1	.....	.....	.....	.....	.....	.....	35
Presbyterian.....	6	20	8	1	2	.....	.....	.....	.....	.....	.....	.....	.....	37
Methodist.....	6	6	16	1	2	.....	1	.....	.....	.....	.....	.....	.....	32
Roman Catholic.....	1	.....	.....	18	.....	1	1	.....	.....	.....	.....	.....	.....	21
Baptist	3	3	2	1	1	.....	.....	.....	.....	.....	.....	.....	.....	10
Congregationalist.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Lutheran	1	1	2	2	.....	.....	9	1	.....	.....	.....	.....	.....	16
Evangelical Association	1	.....	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	4
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Other Denominations..	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	4
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	39	35	36	23	6	2	12	4	1	1	3	.....	.....	162

Licenses, 142

Banns, 20

Marriages by Ages in the City of Stratford, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	4	20	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	31
	20	.....	40	18	6	2	2	.....	.....	.....	.....	.....	.....	.....	68
	25	.....	3	19	8	2	.....	.....	1	.....	.....	.....	.....	.....	33
	30	.....	1	1	4	3	3	2	.....	.....	.....	.....	.....	.....	14
	35	.....	.....	.....	1	3	1	.....	.....	1	.....	.....	.....	.....	6
	40	.....	.....	.....	1	2	.....	1	.....	.....	.....	.....	.....	.....	4
	45	.....	.....	.....	.....	1	2	1	1	.....	.....	.....	.....	.....	5
	50	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		4	64	45	20	13	8	4	3	1	.....	.....	.....	.....	162

Marriages by Denominations in the City of Toronto, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations	Denomination not stated	TOTAL BRIDES.
Anglican.....		1 060	233	168	58	41	16	4	.....	.....	3	12	...	1,595
Presbyterian.....		170	669	1 9	24	44	9	5	.....	.....	2	10	.....	1,062
Methodist.....		165	146	563	26	46	8	4	...	.....	1	10	3	972
Roman Catholic.....		66	36	24	424	5	1	1	...	.....	.....	19	1	577
Baptist		61	56	45	7	108	4	3	.....	.....	.....	5	1	290
Congregationalist.....		13	5	5	.....	3	33	1	..	.....	.....	1	.....	61
Lutheran		6	4	5	3	1	1	21	.....	.....	.....	...	.....	41
Evangelical Association		1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	2
Hebrew		1	.....	.....	.....	.....	.....	.....	.....	326	.....	.....	.....	327
Salvation Army.....		2	4	.....	1	...	.....	.....	.....	22	.....	.....	29
Other Denominations..		8	8	14	15	3	.....	3	.....	.....	.....	151	.....	202
Denomination not stated	
TOTAL GROOMS		1,550	1,160	957	557	252	72	42	1	326	28	208	5	5,158

Licenses, 4,645. Banns, 513.

Marriages by Ages in the City of Toronto, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	71	472	173	17	8	1	2	1	.....	.....	.....	.....	.....	745
	20	22	1,069	769	197	49	22	4	2	.....	1	.....	.....	.....	2,135
	25	.....	162	667	338	120	30	10	.....	3	.....	.....	.....	.....	1,830
	30	.....	11	114	166	94	47	21	5	.....	.....	.....	.....	.....	458
	35	.....	2	14	71	77	50	19	9	7	...	2	2	.....	253
	40	.....	1	2	12	21	31	19	12	8	2	1	1	.....	110
	45	.....	.....	.....	.....	2	18	16	18	10	8	8	1	.....	81
	50	.....	.....	.....	.....	.....	2	2	10	5	5	4	1	.....	29
	55	.....	.....	.....	.....	.....	.....	.....	1	2	4	...	.....	.....	7
	60	.....	.....	.....	.....	.....	.....	.....	1	.....	3	2	3	.....	9
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	...	.....	1
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
TOTALS		93	1,717	1,739	801	371	201	93	59	35	23	18	8	.....	5,159

Marriages by Denominations in the City of Windsor, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican		55	11	13	5	2	.....	.....	1	.....	.....	3	.....	90
Presbyterian		8	49	17	7	3	.....	1	.....	.....	.....	.....	3	87
Methodist.....		8	9	102	9	11	3	5	.....	3	.....	1	1	151
Roman Catholic		12	7	9	136	4	2	3	.....	.....	.....	4	.....	157
Baptist		3	5	7	3	20	.....	.....	.....	.....	.....	2	.....	40
Congregationalist.....		1	2	1	.....	.....	1	.....	1	.....	.....	.....	.....	6
Lutheran	1	4	.....	.....	.....	7	.....	1	.....	.....	.....	13
Evangelical Association		1	.....	.....	.....	.....	1
Hebrew	1	.....	.....	.....	8	.....	.....	.....	9
Salvation Army.....		1	.....	.....	3	.....	.....	4
Other Denominations..		1	2	3	3	1	1	2	.....	.....	.....	21	.....	34
Denomination not stated		2	2
TOTAL GROOMS		88	86	156	163	42	6	19	3	12	3	31	5	614

Licenses, 534.

Banns, 80.

Marriages by Ages in the City of Windsor, 1916.

GROOMS.															
BRIDES.	Age.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	16	96	23	6	2	.....	.....	.....	.....	.....	.....	.....	.....	143
	20	3	120	81	23	7	1	.....	.....	.....	.....	.....	.....	.....	235
	25	.....	19	61	33	10	1	1	.....	.....	.....	.....	.....	.....	125
	30	.....	2	11	15	12	7	.....	1	.....	.....	.....	.....	.....	48
	35	.....	2	1	6	7	6	5	1	1	.....	.....	.....	.....	29
	40	.....	.....	.....	3	3	2	3	3	.....	.....	.....	.....	.....	14
	45	.....	.....	.....	1	.....	.....	2	2	1	.....	1	.....	.....	7
	50	.....	.....	.....	.....	.....	1	.....	1	1	.....	.....	.....	.....	3
	55	.....	.....	.....	.....	.....	.....	1	1	1	2	.....	.....	.....	5
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2	.....	3
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALs		19	239	177	87	41	18	12	9	4	2	2	4	.....	614

Marriages by Denominations in the City of Woodstock, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES
Anglican		16	5	5	.....	1	1	1	.....	.....	.....	1	.....	30
Presbyterian		7	19	7	.....	1	.....	.....	.....	.....	.....	.....	.....	34
Methodist.....		6	4	24	.....	5	1	1	1	.....	.....	.....	.....	42
Roman Catholic	7	1	.....	.....	.....	.....	.....	.....	.....	18
Baptist		2	2	3	1	5	1	.....	.....	.....	.....	.....	.....	14
Congregationalist.....		1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	2
Lutheran		1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Evangelical Association	
Hebrew
Salvation Army.....		2	.....	.....	2
Other Denominations..		2	.....	2
Denomination not stated	
TOTAL GROOMS.....		32	31	39	8	13	4	2	1	.....	2	3	.....	135

Licenses, 127.

Banns, 8.

Marriages by Ages in the City of Woodstock, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	4	12	6	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	23
	20	3	25	17	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	54
	25	.....	5	15	5	5	.....	.....	.....	.....	.....	.....	.....	.....	30
	30	.....	.....	5	4	2	1	.....	.....	1	.....	.....	.....	.....	13
	35	.....	.....	1	1	.....	.....	1	.....	1	.....	.....	.....	.....	4
	40	.....	.....	.....	.....	1	2	1	.....	.....	.....	.....	.....	.....	4
	45	.....	.....	.....	.....	.....	1	1	1	.....	1	.....	.....	.....	4
	50	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		7	42	44	20	8	4	3	1	3	1	.....	2	.....	135

Marriages by Denominations in the Towns of Ontario, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	206	64	67	21	16	2	1	.....	.....	.....	1	.....	378
Presbyterian	47	226	73	6	16	2	2	.....	.....	.....	1	.....	373
Methodist.....	53	60	309	8	25	.....	5	.....	.....	.....	4	.....	464
Roman Catholic.....	20	15	15	332	2	.....	2	.....	.....	.....	2	1	389
Baptist	12	21	16	1	48	1	1	.....	.....	.....	.....	.....	100
Congregationalist.....	4	1	.....	.....	1	1	.....	.....	.....	.....	.....	.....	7
Lutheran	2	1	2	3	.....	.....	32	.....	.....	.....	.....	.....	40
Evangelical Association	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	2
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	6	.....	.....	.....	6
Salvation Army.....	1	1	.....	1	.....	.....	.....	.....	.....	9	.....	.....	12
Other Denominations..	4	5	3	1	1	1	1	.....	.....	.....	35	.....	51
Denomination not stated	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	4	5
TOTAL GROOMS	350	394	486	373	109	7	44	1	6	9	43	5	1,827

Licenses. 1,613.

Banns. 214.

Marriages by Ages in the Towns of Ontario, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated		
	15	36	246	126	25	3	1	1	.....	.....	.....	.....	.....	.....	438
	20	9	366	294	82	21	8	3	1	2	.....	.....	.....	.....	786
	25	3	49	155	89	33	10	5	2	1	.....	.....	.....	.....	347
	30	.....	9	18	43	35	11	5	1	2	.....	1	.....	.....	125
	35	.....	3	3	13	20	9	8	1	1	1	.....	.....	.....	59
	40	.....	.....	.....	1	9	9	7	5	1	.....	.....	.....	.....	32
	45	.....	.....	1	.....	1	.....	7	4	1	.....	.....	.....	.....	14
	50	.....	.....	.....	.....	1	.....	1	3	1	.....	3	1	.....	10
	55	.....	.....	.....	.....	.....	.....	.....	.....	2	2	.....	.....	.....	4
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2	2	.....	6
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	4	.....	.....	5
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	48	673	597	253	123	47	37	18	11	6	10	4	.....	1,827

Marriages by Denominations in the Town of Barrie, 1915.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	5	2	7	1	.....	.....	.....	.....	.....	.....	.....	.....	15
Presbyterian	6	15	4	.....	2	.....	.....	.....	.....	.....	.....	.....	27
Methodist.....	4	2	25	.....	1	.....	.....	.....	.....	.....	.....	.....	32
Roman Catholic	1	1	.....	14	.....	.....	.....	.....	.....	.....	.....	.....	16
Baptist .....	.....	2	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	4
Congregationalist.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Lutheran .....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew ..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	18	22	36	16	5	.....	.....	.....	.....	1	1	.....	99

Licenses, 90.

Banns, 9.

Marriages by Ages in the Town of Barrie, 1915.

GROOMS.															
BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	3	9	9	2	1	.....	.....	.....	.....	.....	.....	.....	.....	24
	20	.....	17	13	4	2	.....	.....	.....	.....	.....	.....	.....	.....	36
	25	.....	6	10	3	2	1	.....	.....	.....	.....	.....	.....	.....	22
	30	.....	1	2	2	4	.....	.....	.....	.....	.....	.....	.....	.....	9
	35	.....	1	.....	2	1	.....	.....	.....	.....	.....	.....	.....	.....	4
	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	45	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	2
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		3	34	34	13	10	1	1	1	.....	1	1	.....	.....	99

Marriages by Denominations in the Town of Brockville, 1916.

GROOME.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations	Denomination not stated	TOTAL BRIDES.
Anglican		18	3	7	3	2	.....	.....	.....	.....	.....	.....	.....	33
Presbyterian	10	6	1	.....	.....	.....	.....	.....	.....	.....	.....	17
Methodist		9	.....	23	.....	2	.....	.....	.....	.....	.....	.....	.....	34
Roman Catholic		6	1	2	15	.....	.....	.....	.....	.....	.....	.....	.....	24
Baptist		1	.....	1	.....	4	.....	.....	.....	.....	.....	.....	.....	6
Congregationalist
Lutheran
Evangelical Association
Hebrew	1	.....	.....	.....	1
Salvation Army	1	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	3
Other Denominations	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Denomination not stated
TOTAL GROOMS		34	15	40	19	8	.....	.....	.....	1	2	.....	.....	119

Licenses, 107.

Banns, 12.

Marriages by Ages in the Town of Brockville, 1915.

GROOMS.														
AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
15	4	24	7	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	36
20	1	24	14	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	43
25	1	4	10	7	1	1	.....	.....	.....	.....	.....	.....	.....	24
30	.....	.....	1	3	1	.....	1	.....	1	.....	.....	.....	.....	7
35	.....	1	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	3
40	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	2
45	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
55	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	2
60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL	6	53	32	16	2	3	3	.....	2	1	1	.....	.....	119

Marriages by Denominations in the Town of Cobalt, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated	
Anglican	7	3	1	.....	1	.....	.....	.....	.....	.....	.....	.....	12
Presbyterian	1	8	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	10
Methodist	1	.....	4	.....	1	.....	.....	.....	.....	.....	1	.....	7
Roman Catholic .....	.....	.....	.....	29	.....	.....	.....	.....	.....	.....	.....	.....	29
Baptist .....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	6	.....	.....	.....	.....	.....	6
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations .....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	4
Denomination not stated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
TOTAL GROOMS	9	12	5	29	4	.....	6	.....	.....	.....	4	1	70

Licenses, 54.

Banns, 16

Marriages by Ages in the Town of Cobalt, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	2	7	6	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	18
	20	.....	9	16	6	1	1	.....	.....	.....	.....	.....	.....	.....	33
	25	.....	1	6	3	2	.....	.....	.....	.....	.....	.....	.....	.....	12
	30	.....	.....	1	1	.....	1	1	.....	.....	.....	.....	.....	.....	4
	35	.....	.....	.....	2	1	.....	.....	.....	.....	.....	.....	.....	.....	3
	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS.		2	17	29	15	4	2	1	.....	.....	.....	.....	.....	.....	76

Marriages by Denominations in the Town of Cobourg, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	5	3	3	.....	.....	1	.....	.....	.....	.....	.....	.....	12
Presbyterian	2	7	5	.....	.....	1	.....	.....	.....	.....	.....	.....	15
Methodist.....	.....	1	14	1	1	.....	.....	.....	.....	.....	.....	.....	17
Roman Catholic	1	.....	.....	8	.....	.....	.....	.....	.....	.....	.....	.....	9
Baptist .....	.....	2	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	4
Congregationalist.....	2	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	3
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Denomination notstated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	10	13	22	9	3	3	.....	.....	.....	.....	1	.....	61

Licenses, 55.

Banns, 6.

Marriages by Ages in the Town of Cobourg, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	2	6	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9
20	11	6	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	18
25	2	10	6	2	.....	.....	.....	.....	.....	.....	.....	.....	20
30	1	1	4	1	.....	.....	.....	.....	.....	.....	.....	7
35	1	2	.....	.....	.....	.....	.....	.....	.....	3
40	1	.....	.....	.....	.....	.....	.....	1
45
50	1	.....	.....	1
55
60	1	1	.....	.....	2
65
70 & over
Age not stated.
TOTALS	2	19	18	8	7	3	1	.....	.....	1	2	.....	.....	61

Marriages by Denominations in the Town of Collingwood, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	6	4	1	.....	1	.....	.....	.....	.....	.....	.....	.....	12
Presbyterian	6	28	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	39
Methodist.....	1	6	12	.....	1	.....	.....	.....	.....	.....	.....	.....	20
Roman Catholic.....	.....	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	3
Baptist	2	2	.....	.....	4	1	.....	.....	.....	.....	.....	.....	9
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Other Denominations..	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	3
Denomination not stated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	17	40	18	3	6	1	.....	.....	.....	.....	2	.....	87

Licenses, 80.

Banns, 7.

Marriages by Ages in the Town of Collingwood, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	.....	6	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
20	3	15	18	3	2	1	1	.....	.....	.....	.....	.....	.....	.....	43
25	4	1	4	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	21
30	2	4	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	7
35	1	.....	1	.....	.....	.....	.....	.....	.....	2
40	1	1	1	.....	.....	.....	.....	.....	3
45
50	1	.....	.....	.....	.....	1
55
60
65
70 & over
Age not stated
TOTALS.	3	25	35	11	5	3	3	1	1	.....	.....	.....	.....	.....	87

Marriages by Denominations in the Town of Cornwall, 1916.

GROOMS	BRIDES.												TOTAL, BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican.....	7	2	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	12
Presbyterian	4	10	4	1	2	.....	.....	.....	.....	.....	.....	.....	21
Methodist	1	1	2	2	3	.....	.....	.....	.....	.....	.....	.....	9
Roman Catholic	1	3	2	57	.....	.....	.....	.....	.....	.....	.....	.....	63
Baptist .....	.....	2	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	3
Congregationalist .....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Lutheran.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	2
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denomination not stated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	13	18	8	63	7	.....	.....	.....	2	.....	.....	.....	111

Licenses, 74.

Banns, 37.

Marriages by Ages in the Town of Cornwall, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	5	19	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32
	20	.....	26	15	.....	1	1	.....	1	.....	.....	.....	.....	.....	44
	25	.....	2	8	4	2	.....	.....	.....	.....	.....	.....	.....	.....	16
	30	.....	1	1	3	1	1	.....	.....	.....	.....	.....	.....	.....	7
	35	.....	1	1	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	5
	40	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	45	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1	.....	2
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	2
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		5	49	34	7	7	2	1	2	.....	.....	2	2	.....	111

Marriages by Denominations in the Town of Ingersoll, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	15	1	4	.....	1	.....	.....	.....	.....	.....	.....	.....	21
Presbyterian	3	1	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
Methodist.....	1	3	9	.....	5	.....	.....	.....	.....	.....	.....	.....	18
Roman Catholic.....	.....	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	4
Baptist	1	.....	1	.....	6	.....	.....	.....	.....	.....	.....	.....	8
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations ..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	20	5	17	4	12	.....	.....	.....	.....	.....	.....	.....	58

Licenses, 54.

Banns, 4.

Marriages by Ages in the Town of Ingersoll, 1916.

GROOMS.

BRIDES.	AGE	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	3	9	3	.....	1	.....	1	.....	.....	.....	.....	.....	.....	17
	20	1	12	5	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	20
	25	1	4	5	2	2	1	.....	.....	.....	.....	.....	.....	.....	15
	30	.....	.....	1	2	.....	.....	1	.....	.....	.....	.....	.....	.....	4
	35	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	40	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		5	25	14	6	5	1	2	.....	.....	.....	.....	.....	.....	58

Marriages by Denominations in the Town of Kenora, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army	Other Denominations.	Denomination not stated.	
Anglican	10	3	1	1	.....	.....	.....	.....	.....	.....	.....	.....	15
Presbyterian .....	.....	5	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	6
Methodist .....	.....	.....	6	.....	.....	.....	1	.....	.....	.....	.....	.....	7
Roman Catholic	1	.....	1	10	.....	.....	.....	.....	.....	.....	.....	.....	12
Baptist .....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran	1	.....	.....	1	.....	.....	3	.....	.....	.....	.....	.....	5
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations ..	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	2	.....	3
Denomination not stated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
TOTAL GROOMS	12	8	9	12	.....	.....	6	.....	.....	.....	2	1	50

Licenses, 45.

Banns, 5.

Marriages by Ages in the Town of Kenora, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	.....	7	8	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	16
	20	.....	10	7	4	1	.....	.....	.....	.....	.....	.....	.....	.....	22
	25	.....	1	3	2	.....	1	.....	.....	.....	.....	.....	.....	.....	7
	30	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	35	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	2
	40	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	2
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS .....	.....	18	18	8	3	2	1	.....	.....	.....	.....	.....	.....	50

Marriages by Denominations in the Town of Lindsay, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican		19	3	1	1	1	.....	.....	.....	.....	.....	.....	.....	25
Presbyterian		4	13	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	22
Methodist.....		5	5	26	.....	.....	.....	.....	.....	.....	.....	.....	.....	36
Roman Catholic.....		1	.....	1	6	.....	.....	1	.....	.....	.....	.....	.....	9
Baptist		1	2	3	.....	3	.....	.....	.....	.....	.....	.....	.....	9
Congregationalist.....	
Lutheran
Evangelical Association	
Hebrew
Salvation Army.....	
Other Denominations..		1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2
Denomination not stated	
TOTAL GROOMS.....		31	23	36	7	4	.....	1	.....	.....	.....	1	.....	103

Licenses, 98.

Banns, 5.

Marriages by Ages in the Town of Lindsay, 1916.

GROOMS.														
AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
15	1	9	5	4	1	.....	.....	.....	.....	.....	.....	.....	.....	20
20	24	21	5	3	1	.....	.....	.....	.....	.....	.....	.....	54
25	1	4	5	1	.....	1	.....	.....	.....	.....	.....	.....	12
30	3	4	.....	1	.....	.....	.....	.....	.....	.....	8
35	1	1	.....	.....	.....	1	.....	.....	.....	3
40	1	.....	2	.....	.....	.....	.....	.....	3
45	1	.....	.....	.....	.....	.....	.....	1
50	2	.....	.....	.....	.....	.....	2
55
60
65
70 & over
Age not stated.
TOTALS	1	34	30	17	10	3	3	4	.....	1	.....	.....	.....	103

Marriages by Denominations in the Town of Midland, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican,	Presbyterian,	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations,	Denomination not stated.	
Anglican	6	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
Presbyterian	1	5	4	.....	.....	1	.....	.....	.....	.....	.....	.....	11
Methodist.....	1	.....	6	.....	.....	.....	1	.....	.....	.....	.....	.....	8
Roman Catholic	2	1	.....	11	.....	.....	.....	.....	.....	.....	.....	.....	14
Baptist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	2
Other Denominations ..	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	10	8	10	11	.....	1	1	.....	.....	2	.....	.....	43

Licenses, 38.

Banns, 5.

Marriages by Ages in the Town of Midland, 1916.

GROOMS.

BRIDES.

AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
15	2	7	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11
20	8	6	2	.....	1	.....	.....	.....	.....	.....	.....	.....	17
25	1	3	2	.....	1	.....	.....	.....	.....	.....	.....	.....	7
30	1	.....	2	2	1	.....	.....	.....	.....	.....	.....	6
35
40	1	.....	.....	.....	.....	.....	.....	.....	.....	1
45
50
55
60	1	.....	.....	.....	1
65
70 & over
Age not stated.
TOTALS	2	16	12	4	3	4	1	.....	.....	1	.....	.....	.....	43

Marriages by Denominations in the Town of North Bay, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated	
Anglican	8	4	4	.....	1	1	.....	.....	.....	.....	.....	.....	18
Presbyterian	2	13	5	1	.....	.....	.....	.....	.....	.....	.....	.....	21
Methodist.....	1	4	8	1	.....	.....	1	.....	.....	.....	.....	.....	15
Roman Catholic.....	.....	.....	3	37	1	.....	.....	.....	.....	.....	.....	.....	41
Baptist .....	.....	1	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	3
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	3
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	12	22	21	39	4	1	1	.....	.....	.....	3	.....	103

Licenses, 73.

Banns, 30.

Marriages by Ages in the Town of North Bay, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	2	12	6	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	22
	20	.....	13	27	5	3	1	.....	.....	.....	.....	.....	.....	.....	49
	25	.....	1	8	7	2	1	.....	.....	.....	.....	.....	.....	.....	19
	30	.....	.....	.....	2	3	.....	.....	.....	1	.....	.....	.....	.....	6
	35	.....	.....	.....	2	1	.....	.....	.....	.....	.....	.....	.....	.....	3
	40	.....	.....	.....	.....	.....	1	1	1	.....	.....	.....	.....	.....	3
	45	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS.	2	26	41	18	10	3	1	1	1	.....	.....	.....	.....	.....	103

Marriages by Denominations in the Town of Orillia, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations	Denomination not stated	
Anglican	6	4	2	.....	3	.....	.....	.....	.....	.....	.....	.....	15
Presbyterian	5	19	6	1	2	.....	1	.....	.....	.....	.....	.....	34
Methodist.....	3	5	18	.....	.....	.....	.....	.....	.....	.....	.....	.....	26
Roman Catholic.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
Baptist.....	2	1	1	.....	3	.....	.....	.....	.....	.....	.....	.....	7
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	6	.....	7
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	16	29	28	2	8	.....	1	.....	.....	.....	6	.....	90

Licenses, 89.

Banns, 1.

Marriages by Ages in the Town of Orillia, 1916.

GROOMS.

BRIDES.	AGE	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	2	15	6	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	26
20	20	13	1	2	.....	.....	.....	.....	.....	.....	.....	.....	36
25	1	9	4	2	.....	.....	1	.....	.....	.....	.....	.....	17
30	1	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
35	1	.....	.....	1	.....	1	.....	.....	.....	.....	3
40	1	.....	.....	.....	.....	.....	.....	1
45	1	.....	.....	.....	.....	.....	.....	1
50
55
60
65	2	.....	.....	2
70 & over
Age not stated.
TOTALS	2	37	28	12	4	.....	3	1	1	.....	2	.....	.....	90

Marriages by Denominations in the Town of Oshawa, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican		19	2	1	1	.....	.....	1	.....	.....	.....	.....	.....	24
Presbyterian		1	2	2	.....	.....	.....	.....	.....	.....	.....	1	.....	6
Methodist.....		2	6	29	.....	.....	.....	.....	.....	.....	.....	2	.....	39
Roman Catholic	3	.....	.....	.....	.....	.....	.....	.....	.....	3
Baptist.....		3	.....	2	.....	.....	.....	.....	.....	.....	.....	5
Congregationalist.....	
Lutheran
Evangelical Association
Hebrew
Salvation Army.....		2	.....	.....	2
Other Denominations..		2	.....	.....	.....	.....	.....	.....	.....	.....	5	.....	7
Denomination not stated	
TOTAL GROOMS		22	12	35	4	2	.....	1	.....	.....	2	8	.....	86

Licenses, 85.

Banns, 1.

Marriages by Ages in the Town of Oshawa, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	1	10	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17
	20	.....	16	16	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	36
	25	.....	2	9	2	3	2	1	1	.....	.....	.....	.....	.....	20
	30	.....	2	.....	2	2	.....	.....	1	.....	.....	.....	.....	.....	7
	35	.....	.....	1	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	3
	40	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
	45	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS	1	30	32	8	7	3	1	3	.....	1	.....	.....	.....	86

Marriages by Denominations in the Town of Owen Sound, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Others Denominations	Denomination not stated.	
Anglican.....	12	9	7	.....	2	.....	.....	.....	.....	.....	.....	.....	30
Presbyterian	3	27	5	.....	3	.....	.....	.....	.....	.....	.....	.....	38
Methodist.....	5	9	30	.....	3	.....	1	.....	.....	.....	1	.....	49
Roman Catholic.....	.....	2	.....	7	.....	.....	.....	.....	.....	.....	.....	.....	9
Baptist.....	.....	3	2	.....	3	.....	.....	.....	.....	.....	.....	.....	8
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	.....	2
Other Denominations..	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	20	51	44	8	11	.....	2	.....	.....	1	2	.....	139

Licenses, 137.

Banns 2.

Marriages by Ages in the Town of Owen Sound, 1916.

GROOMS.

BRIDES.	AGE.	GROOMS.													TOTAL
		15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	
	15	3	18	5	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	27
	20	1	32	27	2	2	1	.....	.....	2	.....	.....	.....	.....	67
	25	1	3	11	7	2	.....	.....	.....	1	.....	.....	.....	.....	25
	30	.....	.....	.....	5	3	1	.....	.....	.....	.....	1	.....	.....	10
	35	.....	.....	.....	.....	1	1	1	1	.....	.....	.....	.....	.....	4
	40	.....	.....	.....	.....	4	.....	1	.....	.....	.....	.....	.....	.....	5
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS.	5	53	43	15	12	3	2	1	3	.....	2	.....	.....	139

Marriages by Denominations in the Town of Pembroke, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican		3	1	2	2	.....	.....	.....	.....	.....	.....	.....	.....	6
Presbyterian	6	2	.....	1	.....	1	.....	.....	.....	.....	.....	10
Methodist.....		2	2	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
Roman Catholic.....		1	1	1	36	.....	.....	.....	.....	.....	.....	.....	.....	39
Baptist
Congregationalist.....	
Lutheran	1	.....	1	.....	.....	4	.....	.....	.....	.....	.....	6
Evangelical Association		1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	2
Hebrew
Salvation Army.....	
Other Denominations..	
Denomination not stated	
TOTAL GROOMS		7	11	11	39	1	.....	5	1	.....	.....	.....	.....	75

Licenses, 54.

Banns, 21.

Marriages by Ages in the Town of Pembroke, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	1	10	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16
	20	.....	15	18	3	2	.....	.....	.....	.....	.....	.....	.....	.....	38
	25	.....	2	7	3	1	.....	1	.....	.....	.....	.....	.....	.....	14
	30	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	2
	35	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	45	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS.	1	27	31	6	4	1	1	1	1	.....	.....	2	.....	75

Marriages by Denominations in the Town of Port Hope, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	5	4	6	1	.....	.....	.....	.....	.....	.....	.....	.....	16
Presbyterian	3	7	5	1	.....	.....	.....	.....	.....	.....	.....	.....	16
Methodist.....	4	3	12	.....	1	.....	.....	.....	.....	.....	.....	.....	20
Roman Catholic .....	.....	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	4
Baptist .....	.....	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
Congregationalist.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	12	17	24	6	1	.....	.....	.....	.....	.....	1	.....	61

Licenses, 57.

Banns, 4.

Marriages by Ages in the Town of Port Hope, 1916.

GROOMS.

BRIDES	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	.....	4	1	1	.....	.....	.....	1	.....	.....	.....	.....	.....	7
	20	.....	18	3	4	.....	.....	2	.....	.....	.....	.....	.....	.....	27
	25	.....	1	8	4	1	.....	.....	.....	.....	.....	.....	.....	.....	14
	30	.....	1	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	4
	35	.....	.....	.....	1	3	.....	1	.....	.....	.....	.....	.....	.....	5
	40	.....	.....	.....	.....	2	1	1	.....	.....	.....	.....	.....	.....	4
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS	.....	24	13	11	7	1	4	1	.....	.....	.....	.....	.....	.....	61

Marriages by Denominations in the Town of Steelton, 1916,

GROOMS	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	1	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	4
Presbyterian	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6
Methodist.....	1	.....	2	.....	2	.....	.....	.....	.....	.....	.....	.....	5
Roman Catholic.....	.....	1	1	15	.....	.....	.....	.....	.....	.....	.....	1	18
Baptist.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	2
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS.....	3	8	4	16	3	.....	.....	.....	.....	.....	2	1	37

Licenses, 33.

Banns, 4.

Marriages by Ages in the Town of Steelton, 1916.

GROOMS.

BRIDES	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over.	Not stated	TOTAL.
	15	.....	4	5	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
	20	.....	8	7	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	18
	25	.....	2	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
	30	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	35	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	2
	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	45	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS.	.....	14	14	6	.....	.....	.....	3	.....	.....	.....	.....	.....	.....	37

Marriages by Denominations in the Town of Sudbury, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	9	6	2	1	.....	.....	.....	.....	.....	.....	.....	.....	18
Presbyterian .....	.....	8	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
Methodist.....	2	2	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	9
Roman Catholic	4	3	.....	38	1	.....	.....	.....	.....	.....	.....	.....	46
Baptist.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	2
Congregationalist.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	16	.....	.....	.....	.....	.....	16
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	2
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
Other Denominations..	1	.....	1	.....	.....	.....	.....	.....	.....	.....	1	.....	3
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	16	20	10	39	2	.....	16	.....	2	1	1	.....	107

Licenses, 83.

Banns, 21.

Marriages by Ages in the Town of Sudbury 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL
	15	1	18	13	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	33
	20	.....	23	18	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	48
	25	.....	1	7	3	.....	.....	1	.....	.....	.....	.....	.....	.....	12
	30	.....	.....	2	4	2	1	.....	.....	.....	.....	.....	.....	.....	9
	35	.....	.....	1	2	1	.....	.....	.....	.....	.....	.....	.....	.....	4
	40	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	1
	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTALS		1	42	41	17	3	1	1	.....	1	.....	.....	.....	.....	107

Marriages by Denominations in the Town of Trenton, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican.....		9	2	5	1	.....	.....	.....	.....	.....	.....	.....	.....	17
Presbyterian		1	7	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	9
Methodist.....		3	3	21	1	1	.....	.....	.....	.....	.....	.....	.....	29
Roman Catholic.....		2	.....	1	2	.....	.....	.....	.....	.....	.....	1	.....	6
Baptist.....	
Congregationalist
Lutheran
Evangelical Association
Hebrew
Salvation Army.....	
Other Denominations	1	.....	1
Denomination not stated
TOTAL GROOMS.....		15	12	27	5	1	.....	.....	.....	.....	.....	2	.....	62

Licenses, 60.

Banns, 2.

Marriages by Ages in the Town of Trenton, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	1	13	3	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	20
	20	2	9	5	4	.....	1	.....	.....	.....	.....	.....	.....	.....	21
	25	.....	1	7	4	1	.....	.....	.....	.....	.....	.....	.....	.....	13
	30	.....	1	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
	35	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	2
	40	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	45	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTAL.	3	24	15	14	3	2	1	.....	.....	.....	.....	.....	.....	62

Marriages by Denominations in the Town of Walkerville, 1916.

GROOMS.	BRIDES.	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	TOTAL BRIDES.
Anglican	6	2	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	10
Presbyterian	1	7	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	11
Methodist.....	.....	2	11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13
Roman Catholic.....	.....	2	3	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
Baptist.....	1	.....	1	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	5
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Denomination not stated .....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	3
TOTAL GROOMS.	8	13	19	2	5	.....	.....	.....	.....	.....	.....	1	2	50

Licenses, 48.

Banns, 2.

Marriages by Ages in the Town of Walkerville, 1916.

GROOMS.

BRIDES.	AGE.	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	1	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
	20	1	15	6	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	26
	25	.....	1	3	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	8
	30	.....	.....	.....	2	3	.....	.....	.....	.....	.....	.....	.....	.....	5
	35	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
	40	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
	45	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS.	2	23	9	10	4	1	1	.....	.....	.....	.....	1	.....	50

Marriages by Denominations in the Town of Welland, 1916.

GROOMS.	BRIDES.												TOTAL BRIDES.
	Anglican.	Presbyterian.	Methodist.	Roman Catholic.	Baptist.	Congregationalist.	Lutheran.	Evangelical Association.	Hebrew.	Salvation Army.	Other Denominations.	Denomination not stated.	
Anglican	16	1	4	3	.....	.....	.....	.....	.....	.....	1	.....	25
Presbyterian	3	7	3	.....	1	.....	.....	.....	.....	.....	.....	.....	14
Methodist.....	4	3	19	1	3	.....	.....	.....	.....	.....	.....	.....	30
Roman Catholic.....	.....	.....	.....	14	.....	.....	.....	.....	.....	.....	.....	.....	14
Baptist	1	.....	2	.....	2	.....	.....	.....	.....	.....	.....	.....	5
Congregationalist .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lutheran .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evangelical Association	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hebrew .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Salvation Army.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other Denominations ..	.....	.....	.....	.....	1	1	.....	.....	.....	.....	4	.....	6
Denomination not stated	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL GROOMS	24	11	28	18	7	1	.....	.....	.....	.....	5	.....	94

Licenses, 88.

Banns, 6.

Marriages by Ages in the Town of Welland, 1916.

GROOMS.

BRIDES	AGE	15	20	25	30	35	40	45	50	55	60	65	70 & over	Not stated	TOTAL.
	15	2	17	11	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	31
	20	.....	19	14	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	38
	25	.....	5	5	4	1	1	1	.....	.....	.....	.....	.....	.....	17
	30	.....	1	3	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
	35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	40	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
	45	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	2
	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	70 & over	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Age not stated.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TOTALS.	2	42	33	11	1	1	2	2	.....	.....	.....	.....	.....	94

CAUSES OF DEATH IN THE DISTRICT OF ALGOMA, 1916.

OFFICIAL ENGLISH TRANSLATION. DISEASES AND CAUSES OF DEATH.		Total.	Ages.										Sex.		Nativity.			Social Con.			Months.																															
Number of Column.		1	Under 1.												Male.		Female.		Not stated.	20	Canada.			Foreign.			Not stated.			21	97	110	17	26	25	17	15	17	21	17	24	13	22	13	14							
0-1	1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38													
Grand Total		224	42	4	5	128	96	...	164	39	21	97	110	17	26	25	17	15	17	21	17	24	13	22	13	14												
I.—GENERAL DISEASES.		46	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	27	19	...	40	5	1	20	23	3	7	5	4	1	4	7	3	4	4	...	...											
Group Total		2	1	1	...	2												
1. Typhoid fever		1												
6. Measles		2											
8. Whooping cough		5											
9. Diphtheria and croup		1											
10. Influenza		5											
11. Military fever		1											
20. Purulent infection and septicæmia		1												
28. Tuberculosis of the lungs.		14											
30. Tuberculous meningitis		2											
31. Abdominal tuberculosis		2											
32. Pott's disease		1											
34. Tuberculosis of other organs		1											
39. Cancer and other malignant tumors of the buccal cavity		1											
40. Cancer and other malignant tumors of the stomach, liver		3											
42. Cancer and other malignant tumors of the female genital organs		1											
45. Cancer and other malignant tumors of other organs or of organs not specified		1											
46. Other tumors (tumors of the female genital organs excepted)		1											
51. Exophthalmic goitre		1											
54. Anæmia, chlorosis		1											
I.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.		18											
Group Total		3											
61. Meningitis		2											
64. Cerebral hæmorrhage, apoplexy		7											
66. Paralysis without specified cause		4											
71. Convulsions of infants		4											

ALGOMA—Continued.

Number of Column.																																					
III.—DISEASES OF THE CIRCULATORY SYSTEM.																																					
Group Total																																					
78. Acute endocarditis	1																																				
79. Organic diseases of the heart	20																																				
81. Diseases of the arteries, aneurysm, etc.	5																																				
IV.—DISEASES OF THE RESPIRATORY SYSTEM.																																					
Group Total																																					
87. Diseases of the larynx	1																																				
89. Acute bronchitis	1																																				
90. Chronic bronchitis	5																																				
91. Broncho-pneumonia	7																																				
92. Pneumonia	28																																				
98. Other diseases of the respiratory system (tuberculosis excepted)	1																																				
V.—DISEASES OF THE DIGESTIVE SYSTEM.																																					
Group Total																																					
103. Other diseases of the stomach (cancer excepted)	2																																				
104. Diarrhoea and enteritis (under 2 years)	6																																				
105. Diarrhoea and enteritis (2 years and over)	5																																				
108. Appendicitis and typhlitis	1																																				
109. Hernias, intestinal obstructions	2																																				
117. Simple peritonitis (non-puerperal)	2																																				
VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.																																					
Group Total																																					
119. Acute nephritis	2																																				
120. Bright's disease	6																																				
124. Diseases of the bladder	1																																				
VII.—THE PUERPERAL STATE.																																					
Group Total																																					
135. Puerperal hemorrhage	3																																				
137. Puerperal septicæmia	1																																				
XI.—DISEASES OF EARLY INFANCY.																																					
Group Total																																					
151. Congenital debility, icterus, and sclerema	17																																				
153. Lack of care	3																																				

OFFICIAL ENGLISH TRANSLATION.
DISEASES AND CAUSES OF DEATH.

OFFICIAL ENGLISH TRANSLATION. DISEASES AND CAUSES OF DEATH.																																				
Total.	Ages.											Sex.		Nativity.		Social Con.		Months.																		
	Under 1.											Male.	Female.	Not stated.	Canada.	Foreign.	Not stated.	Single.	Married.	Not stated.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.				
	2	3	4	5	6	7	8	9	10	11	12																						13	14	15	16
1	Number of Column.																																			
256	I.—GENERAL DISEASES.																																			
58	Grand Total																																			
2	Group Total																																			
5	6. Measles																																			
1	8. Whooping cough																																			
5	9. Diphtheria and croup																																			
1	10. Influenza																																			
1	14. Dysentery																																			
1	18. Erysipelas																																			
1	20. Purulent infection and septicæmia																																			
1	24. Tetanus																																			
17	28. Tuberculosis of the lungs																																			
1	39. Cancer and other malignant tumors of the buccal cavity																																			
1	40. Cancer and other malignant tumors of the stomach, liver																																			
1	41. Cancer and other malignant tumors of the peritonæum, intestines, rectum																																			
3	42. Cancer and other malignant tumors of the female genital organs																																			
1	43. Cancer and other malignant tumors of the breast																																			
3	45. Cancer and other malignant tumors of other organs or of organs not specified																																			
2	46. Other tumors (tumors of the female genital organs excepted)																																			
1	48. Chronic rheumatism and gout																																			
1	50. Diabetes																																			
4	51. Exophthalmic goitre																																			
1	54. Anæmia, chlorosis																																			
5	55. Other general diseases																																			
1	I.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.																																			
22	Group Total																																			
3	63. Other diseases of the spinal cord																																			
12	64. Cerebral hæmorrhage, apoplexy																																			

BRANT—Concluded.

[illegible]

BRUCE—Continued.

[illegible]

CAUSES OF DEATH IN THE COUNTY OF CARLETON, 1916.

[illegible]

III.—DISEASES OF THE CIRCULATORY SYSTEM.

Group Total

79. Organic diseases of the heart
81. Diseases of the arteries, atheroma, aneurysm,
etc.

IV.—DISEASES OF THE RESPIRATORY SYSTEM.

Group Total

89. Acute bronchitis
90. Chronic bronchitis
91. Broncho-pneumonia
92. Pneumonia
94. Pulmonary congestion, pulmonary apoplexy
95. Gangrene of the lung.....

V.—DISEASES OF THE DIGESTIVE SYSTEM.

Group Total

103. Other diseases of the stomach (cancer excepted)
 108. Appendicitis and typhlitis
 109. Hernias, intestinal obstructions
 113. Cirrhosis of the liver
 117. Simple peritonitis (non-puerperal)

VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.

Group Total

120. Bright's disease
123. Calculi of the urinary passages
126. Diseases of the prostate

VII.—THE PUERPERAL STATE.

Group Total

137. Puerperal septicæmia

VIII.—DISEASES OF THE SKIN AND OF THE
CELLULAR TISSUE.

Group Total

142. Gangrene

X.—CONGENITAL MALFORMATIONS.

Group Total

150. Congenital malformations (still-births not included)

DUFFERIN—Concluded.

Number of Column.																																						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
XI.—DISEASES OF EARLY INFANCY.																																						
15	15																8	7		15				15			3	5	2	1		1	2	1				
Group Total																																						
151. Congenital debility, icterus, and sclerema	15	15															8	7		15				15			3	5	2	1		1	2	1				
154.																																						
XII.—OLD AGE.																																						
19													1	4	14		11	8		7	12			2	17		1	1	3	2		4	2	1	2	1	2	
Group Total																																						
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																						
6		1						1			1		2		1		6			5	1			3							2	1		1		2		
Group Total																																						
157. Suicide by hanging or strangulation	1														1		1				1				1											1		
165. Other acute poisonings	1																1				1																	
172. Traumatism by fall	1																1				1																	
175. Traumatism by other crushing.																	1				1																	
(a) Railroad	1														1		1				1																	
(b) Street car																																						
(c) Automobile																																						
(d) Other crushing																																						
176. Injuries by animals	1																1				1																	
186. Other external violence	1																1				1																	
STILL-BIRTHS.																																						
Not included in totals	10	10															7	3		10				10			1		2		2	1	1	1		1	1	

OFFICIAL ENGLISH TRANSLATION.
DISEASES AND CAUSES OF DEATH.

Number of Column.

Grand Total
I.—GENERAL DISEASES.

Group Total	93
1. Typhoid fever	2
6. Measles	5
8. Whooping cough	4
9. Diphtheria and croup	1
10. Influenza	8
18. Erysipelas	1
28. Tuberculosis of the lungs	14
29. Acute military tuberculosis	2
30. Tuberculous meningitis	2
40. Cancer and other malignant tumors of the stomach, liver	10
41. Cancer and other malignant tumors of the peritoneum, intestines, rectum	3
43. Cancer and other malignant tumors of the breast	2
44. Cancer and other malignant tumors of the skin	1
45. Cancer and other malignant tumors of other organs or of organs not specified	18
46. Other tumors (tumors of the female genital organs excepted)	1
47. Acute articular rheumatism	2
48. Chronic rheumatism and gout	8
50. Diabetes	3
51. Exophthalmic goitre	2
54. Anæmia, chlorosis	4

II.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.

Group Total	57
61. Meningitis	5
62. Locomotor ataxia	1
63. Other diseases of the spinal cord	6

Total.

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352

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2

ELGIN—Continued.

[illegible]

FRONTENAC--Continued.

Number of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
IV.—DISEASES OF THE RESPIRATORY SYSTEM.																																									
Group Total		40	8	1	1	1	1	1	2	3	1	5	5	6	5	3	..	26	14	..	36	4	..	18	22	..	5	7	6	2	3	5	2	..	..	..	3	3	4	
89. Acute bronchitis		1	1	1	1	
90. Chronic bronchitis		3	1	1	1	..	3	3	3	
91. Broncho-pneumonia		7	1	1	2	1	1	6	1	..	5	2	..	3	
92. Pneumonia		26	7	1	2	3	..	4	4	3	2	17	9	..	25	1	..	14	12	..	4	4	3	1	2	3	1	2	2	4	
93. Pleurisy		2	1	2	1	..	1	2	1	..	
94. Pulmonary congestion, pulmonary apoplexy		1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
V.—DISEASES OF THE DIGESTIVE SYSTEM.																																									
Group Total		15	4	1	1	2	2	..	3	2	8	7	..	15	8	7	..	1	1	2	2	1	2	2	1	1	1	1	1	1	1	
102. Ulcer of the stomach		3	1	1	2	1	..	3	1	2	1	..	
103. Other diseases of the stomach (cancer excepted)		1	1	1	
104. Diarrhoea and enteritis (under 2 years)		3	3	3	1	3	
105. Diarrhoea and enteritis (2 years and over)		1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
108. Appendicitis and typhlitis		1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
109. Hernias, intestinal obstructions		4	2	..	2	1	3	..	4	
110. Diseases of the intestines		1	1	1	1	1	..	
117. Simple peritonitis (non-puerperal)		1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.																																									
Group Total		8	2	3	2	1	7	1	..	8	4	4	2	1	..	2	1	1	..	1	..	1	
119. Acute nephritis		2	2	2	2	1	1	
120. Bright's disease		5	2	2	1	4	1	..	5	2	3	
122. Other diseases of the kidneys and adnexa		1	1	1	1	1	
VII.—THE PUERPERAL STATE.																																									
Group Total		3	2	1	3	3	3	1	..	1	
184. Accidents of pregnancy		1	1	1	1	
137. Puerperal septicæmia		1	1	..	1	1	
138. Puerperal albuminuria and convulsions		1	1	1	..	1	1	
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.																																									
Group Total		2	1	..	1	1	1	..	1	1	2	1	1	
142. Gangrene		2	1	..	1	1	1	..	1	1	2	1	1	

GREY—Continued.

Number of Column.																																					
VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.																																					
Group Total																																					
119. Acute nephritis																																					
120. Bright's disease																																					
122. Other diseases of the kidneys and adnexa...																																					
VII.—THE PUERPERAL STATE.																																					
Group Total																																					
134. Accidents of pregnancy																																					
136. Other accidents of labor																																					
137. Puerperal septicæmia																																					
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.																																					
Group Total																																					
142. Gangrene																																					
143. Furuncle																																					
144. Acute abscess																																					
X.—CONGENITAL MALFORMATIONS.																																					
Group Total																																					
150. Congenital malformations (still-births not included)																																					
XI.—DISEASES OF EARLY INFANCY.																																					
Group Total																																					
151. Congenital debility, icterus, and sclerema...																																					
154.																																					
XII.—OLD AGE.																																					
Group Total																																					

HALDIMAND—Concluded.

Number of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
154.																																									
XII.—OLD AGE.																																									
Group Total		30													1	7	22	20	10			13	17		3	27			2	3	3	1	2			4	4	3	1		
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																									
Group Total		11	1	1	1	1	1	1	1	2	2	2	1	1	1	1	1	9	2		10	1		6	5	1			1		2		1	2	2	1	1	1	1		
155. Suicide by poison		1															1					1				1														1	
165. Other acute poisonings		1		1														1				1																			
166. Conflagration		1																1						1																	
169. Accidental drowning		1								1								1							1															1	
175. Traumatism by other crushing.																																									
(a) Railroad		1										1										1				1															
(b) Street car																																									
(c) Automobile																																									
(d) Other crushing		1																																							
185. Fractures (cause not specified)		3									1	1	1				3		1			2				1															
186. Other external violence		2	1								1							1				2																			
XIV.—ILL-DEFINED DISEASES.																																									
Group Total		5			1								1		1	2		4	1		5				1	4						1		1					1	1	
187. Ill-defined organic disease		1			1																1				1																
188. Sudden death		4											1		1	2		3	1		4					4														1	
STILL-BIRTHS.																																									
Not included in totals		15	15															9	6		15				15				1	1	4	2	1	2		1			1	2	

HALIBURTON—Concluded.

[illegible]

HALTON—Continued.

[illegible]

X.—CONGENITAL MALFORMATIONS.

X.—CONGENITAL MALFORMATIONS.									
	Group Total	1	1	1	1	1	1	1	1
150. Congenital malformations (still-births not included)	1	1	1	1	1	1	1	1	1
XI.—DISEASES OF EARLY INFANCY.									
	21	21	21	9	12	9	21	21	21
151. Congenital debility, icterus, and sclerema	21	21	21	9	12	9	21	21	21
XII.—OLD AGE.									
154.									
	22			5	17	12	10	12	4
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.									
	10	1	1	1	3	6	4	6	4
155. Suicide by poison	1							1	
156. Accidental drowning	3	1	1	1	2	1	1	1	2
170. Traumatism by firearms	1		1						
181. Electricity (lightning excepted)	1		1						
185. Fractures (cause not specified)	3		2	1	1	2	2	1	1
186. Other external violence	1		1				1		
XIV.—ILL-DEFINED DISEASES.									
	1								
189. Cause of death not specified or ill-defined	1								
STILL-BIRTHS.									
Not included in totals	13	13		7		6	13		13

XIV.—ILL-DEFINED DISEASES.

[illegible]

III.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.

[illegible]

III—DISEASES OF THE CIRCULATORY SYSTEM.

IV—DISEASES OF THE RESPIRATORY SYSTEM.

V.—DISEASES OF THE DIGESTIVE SYSTEM.

XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.

Group Total	15	2	1	1	3	4	4	6	1	2	1	19	6	28	2	1	8	16	1	8	9	5	1	2	5	1	6	1
155. Suicide by poison	7					1	1	1	1			3		2				1										
157. Suicide by hanging or strangulation	1												1	1				1					1					
165. Other acute poisonings	1													1														
167. Burns (conflagration excepted)	1													1				1										
169. Accidental drowning	5											1		1				1										
170. Traumatism by firearms	3											1		1				3										
175. Traumatism by other crushing.												2		3				1										
(a) Railroad	3											3		3				2										
(b) Street car																												
(c) Automobile	1											1		1				1										
(d) Other crushing																												
176. Injuries by animals	2											1		2				2										
179. Effects of heat	2												2	1				2										
184. Homicide by other means	1											1		1				1										
185. Fractures (cause not specified)	1											1		1				1										
186. Other external violence	2											2		2				1										
Group Total	6	2					3		1			5	1	5	1		3	3	1	1	1	1	1	1	1	6	1	
188. Sudden death	2	1					1					2		2			1	1		1								
189. Cause of death not specified or ill-defined	4	1					2					3	1	3	1		2	2										
Not included in totals	27	37										17	10	27			97			1	5	1	1	4	1	2	3	4

XIV.—ILL-DEFINED DISEASES.

Group Total

188. Sudden death

189. Cause of death not specified or ill-defined

STILL-BIRTHS.

XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.

Group Total		20	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
158. Suicide by drowning	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
160. Suicide by cutting or piercing instruments	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
163. Other suicides	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
165. Other acute poisonings	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
167. Burns (conflagration excepted)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
169. Accidental drowning	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
176. Injuries by animals	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
185. Fractures (cause not specified)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
186. Other external violence	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
187. Ill-defined organic disease	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
189. Cause of death not specified or ill-defined	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1	2	3	1	4	2	3	1	4	2	3	1	4	2	1	1	3
Group Total		2	1	1	1	1	1	1	2	3	1	3	1																

XIV.—ILL-DEFINED DISEASES.

Group Total	2
187. Ill-defined organic disease	1
189. Cause of death not specified or ill-defined	1
Not included in totals	41

Number of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
122. Other diseases of the kidneys and adnexa...		3																																						
123. Calculi of the urinary passages		3																																						
124. Diseases of the bladder		1																																						
126. Diseases of the prostate		2																																						
VII.—THE PUERPERAL STATE.																																								
Group Total		8																																						
134. Accidents of pregnancy		2																																						
138. Puerperal albuminuria and convulsions		6																																						
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.																																								
Group Total		3																																						
142. Gangrene		2																																						
144. Acute abscess		1																																						
X.—CONGENITAL MALFORMATIONS.																																								
Group Total		6																																						
150. Congenital malformations (still-births not included)		6																																						
XI.—DISEASES OF EARLY INFANCY.																																								
Group Total		54																																						
151. Congenital debility, icterus, and sclerema		54																																						
154. XII.—OLD AGE.																																								
Group Total		53																																						
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																								
Group Total		26																																						
155. Suicide by poison		2																																						
159. Suicide by firearms		1																																						

[illegible]

OFFICIAL ENGLISH TRANSLATION.
DISEASES AND CAUSES OF DEATH.

DISEASES AND CAUSES OF DEATH.	Number of Column.	Total.	Ages.												Sex.		Nativity.			Social Con.		Months.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
			Under 1.												Male.	Female.	Canada.	Foreign.	Not stated.	Single.	Married.	Not stated.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
			0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12																					13-14	14-15	15-16	16-17	17-18	18-19	19-20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Grand Total		500	73	9	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20

I.—GENERAL DISEASES.

LAMBTON—Continued.

[illegible]

[illegible]

XIV.—ILL-DEFINED DISEASES.

Group Total

188. Sudden death

189. Cause of death not specified or ill-defined

STILL-BIRTHS.

Not included in totals

OFFICIAL ENGLISH TRANSLATION.
DISEASES AND CAUSES OF DEATH.

[illegible]

LANARK—Concluded.

		Number of Column.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
	Group Total	3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

CAUSES OF DEATH IN THE COUNTIES OF LEEDS AND GRENVILLE, 1916. (BROCKVILLE NOT INCLUDED.)

DISEASES AND CAUSES OF DEATH.	Number of Column.	Ages.													Sex.		Nativity.		Social Con.		Months.															
															Male.	Female.	Canada.	Foreign.	Not stated.	Single.	Married.	Not stated.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
		Under 1.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.																					13.	14.
Total.	1	50	8	4	4	2	7	1	7	29	45	55	77	134	122	4	273	301	487	85	2	233	338	3	68	55	64	53	39	44	36	32	47	46	38	52
Grand Total	574	50	8	4	4	2	7	1	7	29	45	55	77	134	122	4	273	301	487	85	2	233	338	3	68	55	64	53	39	44	36	32	47	46	38	52
		127	3	1	1	1	2	5	15	11	18	19	19	18	15	1	50	77	115	12	94	32	1	16	11	16	16	9	5	4	12	12	13	7	4	
I.—GENERAL DISEASES.																																				
Group Total																																				
1. Typhoid fever																																				
6. Measles																																				
10. Influenza																																				
18. Erysipelas																																				
26. Pellagra																																				
28. Tuberculosis of the lungs.																																				
30. Tuberculous meningitis																																				
32. Pott's disease																																				
36. Rickets																																				
39. Cancer and other malignant tumors of the buccal cavity																																				
40. Cancer and other malignant tumors of the stomach, liver																																				
41. Cancer and other malignant tumors of the peritonæum, intestines, rectum																																				
42. Cancer and other malignant tumors of the female genital organs																																				
43. Cancer and other malignant tumors of the breast																																				
45. Cancer and other malignant tumors of other organs or of organs not specified																																				
47. Acute articular rheumatism																																				
48. Chronic rheumatism and gout																																				
50. Diabetes																																				
51. Exophthalmic goitre																																				
52. Addison's disease																																				
53. Leucæmia																																				
54. Anæmia, chlorosis																																				
55. Other general diseases																																				
II.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.																																				
Group Total																																				
61. Meningitis																																				
62. Locomotor ataxia																																				

LEEDS AND GRENVILLE—Continued.

[illegible]

LEEDS AND GRENVILLE—Concluded.

Number of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																									
	Group Total	23					1	2			5	2	5	4	2	2			19	1			21	2		12	10	1	1	1	1	4	3	3	1	2	3	1	2		
155.	Suicide by poison	1										1									1																				
160.	Suicide by cutting or piercing instruments	1												1																											
163.	Other suicides	1																																							
165.	Other acute poisonings	1																																							
167.	Burns (conflagration excepted)	1																																							
169.	Accidental drowning	2																																							
170.	Traumatism by firearms	3																																							
175.	Traumatism by other crushing.																																								
	(a) Railroad	6																																							
	(b) Street car																																								
	(c) Automobile																																								
	(d) Other crushing																																								
177.	Starvation	1																																							
185.	Fractures (cause not specified)	2																																							
186.	Other external violence	4																																							
XIV.—ILL-DEFINED DISEASES.																																									
	Group Total	1																																							
189.	Cause of death not specified or ill-defined	1																																							
STILL-BIRTHS.																																									
Not included in totals		12	12																6	6			12			12			2	2		1			2	1		1	2	1	

CAUSES OF DEATHS IN THE COUNTIES OF LENNOX AND ADDINGTON, 1916.

Total.		Ages.																			Sex.		Nativity.			Social Con.			Months.																				
		Number of Column.																																															
1		2																			109		190			27			64			145			26														
2		3																			108		43			43			13			24			25			26											
3		4																			107		42			42			12			23			23			24											
4		5																			106		41			41			11			22			22			25											
5		6																			105		40			40			10			21			21			26											
6		7																			104		39			39			9			20			20			27											
7		8																			103		38			38			8			19			19			28											
8		9																			102		37			37			7			18			18			29											
9		10																			101		36			36			6			17			17			30											
10		11																			100		35			35			5			16			16			31											
11		12																			99		34			34			4			15			15			32											
12		13																			98		33			33			3			14			14			33											
13		14																			97		32			32			2			13			13			34											
14		15																			96		31			31			1			12			12			35											
15		16																			95		30			30			0			11			11			36											
16		17																			94		29			29			0			10			10			37											
17		18																			93		28			28			0			9			9			38											
18		19																			92		27			27			0			8			8			39											
19		20																			91		26			26			0			7			7			40											
20		21																			90		25			25			0			6			6			41											
21		22																			89		24			24			0			5			5			42											
22		23																			88		23			23			0			4			4			43											
23		24																			87		22			22			0			3			3			44											
24		25																			86		21			21			0			2			2			45											
25		26																			85		20			20			0			1			1			46											
26		27																			84		19			19			0			0			0			47											
27		28																			83		18			18			0			0			0			48											
28		29																			82		17			17			0			0			0			49											
29		30																			81		16			16			0			0			0			50											
30		31																			80		15			15			0			0			0			51											
31		32																			79		14			14			0			0			0			52											
32		33																			78		13			13			0			0			0			53											
33		34																			77		12			12			0			0			0			54											
34		35																			76		11			11			0			0			0			55											
35		36																			75		10			10			0			0			0			56											
36		37																			74		9			9			0			0			0			57											
37		38																			73		8			8			0			0			0			58											
38		39																			72		7			7			0			0			0			59											
39		40																			71		6			6			0			0			0			60											
40		41																			70		5			5			0			0			0			61											
41		42																			69		4			4			0			0			0			62											
42		43																			68		3			3			0			0			0			63											
43		44																			67		2			2			0			0			0			64											
44		45																			66		1			1			0			0			0			65											
45		46																			65		0			0			0			0			0			66											
46		47																			64		0			0			0			0			0			67											
47		48																			63		0			0			0			0			0			68											
48		49																			62		0			0			0			0			0			69											
49		50																			61		0			0			0			0			0			70											
50		51																			60		0			0			0			0			0			71											
51		52																			59		0			0			0			0			0			72											
52		53																			58		0			0			0			0			0			73											
53		54																			57		0			0			0			0			0			74											
54		55																			56		0			0			0			0			0			75											
55		56																			55		0			0			0			0			0			76											
56		57																			54		0			0			0			0			0			77											
57		58																			53		0			0			0			0			0			78											
58		59																			52		0			0			0			0			0			79											
59		60																			51		0			0			0			0			0			80											
60		61																			50		0			0			0			0			0			81											
61		62																			49		0			0			0			0			0			82											
62		63																			48		0			0			0			0			0			83											
63		64																			47		0			0			0			0			0			84											
64		65																			46		0			0			0			0			0			85											
65		66																			45		0			0			0			0			0			86											
66		67																			44		0			0			0			0			0			87											
67		68																			43		0			0			0			0			0			88											
68		69																			42		0			0			0			0			0			89											
69		70																			41		0			0			0			0			0			90											
70		71																			40		0			0			0			0			0			91											
71		72																			39		0			0			0			0			0			92											
72		73																			38		0			0			0			0			0			93											
73		74																			37		0			0			0			0			0			94											
74		75																			36		0			0			0			0			0			95											
75		76																			35		0			0			0			0			0			96											
76		77																			34		0			0			0			0			0			97											
77		78																			33		0			0			0			0			0			98											
78		79																			32		0			0			0			0			0			99											
79		80																			31		0			0			0			0			0			100											
80		81																			30		0			0			0			0			0			101											
81		82																			29		0			0			0			0			0			102											
82		83																			28		0			0			0			0			0			103											
83		84																			27		0			0			0			0			0			104											
84		85																			26		0			0			0			0			0			105											
85		86																			25		0			0			0			0			0			106											
86		87																			24		0			0			0			0			0			107											
87		88																			23		0			0			0			0			0			108											
88		89																			22		0			0			0			0			0			109											
89		90																			21		0			0			0			0			0			110											
90		91																			20		0			0			0			0			0			111											
91		92																			19		0			0			0			0			0			112											
92		93																			18		0			0			0			0			0			113											
93		94																			17		0			0			0			0			0			114											
94		95																			16		0			0			0			0			0			115											
95		96																			15		0			0			0			0			0			116											
96		97																			14		0			0			0			0			0			117											
97		98																			13		0			0			0			0			0			118											
98		99																			12		0			0			0			0			0			119											
99		100																			11		0			0			0			0			0			120											
100		101																			10		0			0			0			0			0			121											
101		102																			9		0			0			0			0			0			122											
102		103																			8		0			0			0			0			0			123											
103		104																			7		0			0			0			0			0			124											
104		105																			6		0			0			0			0			0			125											
105		106																			5		0			0			0			0			0			126											
106		107																			4		0			0			0			0			0			127											
107		108																			3		0			0			0			0			0			128											
108		109																			2		0			0			0			0			0			129											
109		110																			1		0			0			0			0			0			130											
110		111																			0		0			0			0			0			0			131											
111		112																			0		0			0			0			0			0			132											
112		113																			0		0			0			0			0			0			133											
113		114																			0		0			0			0			0			0			134											
114		115																			0		0			0			0			0			0			135											
115		116																			0		0			0			0			0			0			136											
116		117																			0		0			0			0			0			0			137											
117		118																			0		0			0			0			0			0			138											
118		119																			0		0			0			0			0			0			139											
119		120																			0		0			0			0			0			0			140											
120		121																			0		0			0			0			0			0			141											
121		122																			0		0			0			0			0			0			142											
122		123																			0		0			0			0			0			0			143											
123		124																			0		0			0			0			0			0			144											
124		125																			0		0			0			0			0			0			145											
125		126																			0		0			0			0			0			0			146											
126		127																			0		0			0			0			0			0			147											
127		128																			0		0			0			0			0			0			148											
128		129																			0		0			0			0			0			0			149											
129		130																			0		0			0			0			0			0			150											
130		131																			0		0			0			0			0			0			151											
131		132																			0		0			0			0			0			0			152											
132		133																			0		0			0			0			0			0			153											
133		134																			0		0			0			0			0			0														

XI.—DISEASES OF EARLY INFANCY.

Group Total

151.	Congenital debility, icterus, and sclerema	.....
153.	Lack of care	.....

153. Lack of care

R.G. 154.

XII.—OLD AGE.

Group Total

XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.

Group Total

157. Suicide by hanging or strangulation

172. Traumatism by fall

175. Traumatism by other crushing, 112.

Tonnage by other crushing.	
1900	1,000,000
1901	1,000,000
1902	1,000,000
1903	1,000,000
1904	1,000,000
1905	1,000,000
1906	1,000,000
1907	1,000,000
1908	1,000,000
1909	1,000,000
1910	1,000,000
1911	1,000,000
1912	1,000,000
1913	1,000,000
1914	1,000,000
1915	1,000,000
1916	1,000,000
1917	1,000,000
1918	1,000,000
1919	1,000,000
1920	1,000,000
1921	1,000,000
1922	1,000,000
1923	1,000,000
1924	1,000,000
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1926	1,000,000
1927	1,000,000
1928	1,000,000
1929	1,000,000
1930	1,000,000
1931	1,000,000
1932	1,000,000
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1934	1,000,000
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1943	1,000,000
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2014	1,000,000
2015	1,000,000
2016	1,000,000
2017	1,000,000
2018	1,000,000
2019	1,000,000
2020	1,000,000
2021	1,000,000
2022	1,000,000
2023	1,000,000
2024	1,000,000
2025	1,000,000
2026	1,000,000

(a) Railroad
(b) Street car

(b) Street car
(c) Automobile

(c)	Automobile	.....
(3)	Outstanding	.....

(d) Other crushing

179. Effects of heat

185. Fractures (cause not specified)

STILL-BIRTHS.

Not included in totals

LINCOLN—Concluded.

Number of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38				
IX.—DISEASES OF THE BONES AND OF THE ORGANS OF LOCOMOTION.																																											
Group Total		1											1						1			1					1																
146. Diseases of the bones (tuberculosis excepted).		1											1						1			1					1																
XI.—DISEASES OF EARLY INFANCY.																																											
Group Total		21	21																16	5		21							1	3	1	1	3	3	1	1	2	1	2	2			
151. Congenital debility, icterus, and sclerema		20	20																15	5		20								1	3	1	1	3	1	1	1	1	1	2	2		
153. Lack of care		1	1																1			1																					
XII.—OLD AGE.																																											
Group Total		24															8	16		11	13		14	9	1	2	22			3	3	1	4	1	1	1	1	1	3	4	1		
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																											
Group Total		24				1	1	5	2		3	1	3	2	4	1	2		20	4		15	5	4	12	9		3	3	1	1	3	2	2	2	2	1	3	3	1			
167. Burns (conflagration excepted)		2						1											1	1		2																					
168. Absorption of deleterious gases (conflagration excepted)		1						1														1																					
169. Accidental drowning		6						2	1		2	1							5	1		5	1		4	2																	
172. Traumatism by fall		1																	1			1																					
175. Traumatism by other crushing.																																											
(a) Railroad		2																	1	1																							
(b) Street car																																											
(c) Automobile		2						1											2																								
(d) Other crushing																																											
Injuries by animals		1																	1																								
180. Lightning		1																	1																								
185. Fractures (cause not specified)		2																	2																								
186. Other external violence		6						1	1		1	1						6				4	1	1	1	2	3		1	1	1												
XIV.—ILL-DEFINED DISEASES.																																											
Group Total		2																	1	1			1				1																
188. Sudden death		1																	1																								
189. Cause of death not specified or ill-defined		1																																									

MANITOULIN—Concluded.

Number of Column.																																
V.—DISEASES OF THE DIGESTIVE SYSTEM.																																
	Group Total																															
103.	Other diseases of the stomach (cancer excepted)																															
104.	Diarrhea and enteritis (under 2 years)																															
108.	Appendicitis and typhitis																															
VI.—NON-VEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.																																
	Group Total																															
119.	Acute nephritis																															
120.	Bright's disease																															
122.	Other diseases of the kidneys and adnexa																															
VII.—THE PUERPERAL STATE.																																
	Group Total																															
134.	Accidents of pregnancy																															
136.	Other accidents of labor																															
X.—CONGENITAL MALFORMATIONS.																																
	Group Total																															
150.	Congenital malformations (still-births not included)																															
XI.—DISEASES OF EARLY INFANCY.																																
	Group Total																															
151.	Congenital debility, icterus, and sclerema																															
154.																																
XII.—OLD AGE.																																
	Group Total																															
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																
	Group Total																															
167.	Burns (conflagration excepted)																															
169.	Accidental drowning																															
170.	Traumatism by firearms																															
172.	Traumatism by fall																															
173.	Traumatism in mines and quarries																															
186.	Other external violence																															
XIV.—ILL-DEFINED DISEASES.																																
	Group Total																															
189.	Cause of death not specified or ill-defined																															
STILL-BIRTHS.																																
Not included in totals																																

[illegible]

MUSKOKA—Concluded.

Number of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
XI.—DISEASES OF EARLY INFANCY.																																									
Group Total		21	21																14	7		21				21			2	2	3		4		1	6	2		1		
151. Congenital debility, icterus, and sclerema		21	21															14	7		21				21			2	2	3		4		1	6	2		1			
154. XII.—OLD AGE.																																									
Group Total		18															3	15	11	7		5	13				18		1	1	3	1	2	1	3	1	1	1	3		
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																									
Group Total		4						1	1	1		1				1			3	1		2	2			2	2						2	1			1				
169. Accidental drowning		3						1	1	1		1						2	1		1		1	2		2	1						2				1				
173. Traumatism in mines and quarries		1														1			1			1					1							1							
XIV.—ILL-DEFINED DISEASES.																																									
Group Total		1														1			1				1				1													1	
188. Sudden death		1													1			1					1				1												1		
Still-Births.																																									
Not included in totals		15	15																8	7		15				15			1	2		2	2	3	1	1		1	1		

CAUSES OF DEATH IN THE DISTRICT OF NIPISSING, 1916 (NORTH BAY NOT INCLUDED).

OFFICIAL ENGLISH TRANSLATION. DISEASES AND CAUSES OF DEATH.		Number of Column.	Ages.													Sex.		Nativity.		Social Con.		Months.																				
																Male.	Female.	Canada.	Foreign.	Not stated.	Single.	Married.	Not stated.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.							
			Under 1.	1.	2.	3.	4.	5-9.	10-14.	15-19.	20-29.	30-39.	40-49.	50-59.	60-69.																					70-79.	80 and over.	Not stated.				
Total.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38				
Grand Total		236	73	10	3	4	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18
I.—GENERAL DISEASES.		52	4	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
8. Whooping cough		2	2	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
9. Diphtheria and croup		16	2	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
28. Tuberculosis of the lungs		18	2	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
31. Abdominal tuberculosis		3	2	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
33. White swelling		2	2	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
34. Tuberculosis of other organs		2	2	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
40. Cancer and other malignant tumors of the stomach, liver		1	2	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
41. Cancer and other malignant tumors of the peritonæum, intestines, rectum		1	2	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
43. Cancer and other malignant tumors of the breast		1	2	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
45. Cancer and other malignant tumors of other organs or of organs not specified		1	2	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
47. Acute articular rheumatism		1	2	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
50. Diabetes		1	2	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
53. Leucæmia		1	2	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
54. Anæmia, chlorosis		1	2	2	1	1	3	9	1	2	7	6	3	3	2	1	36	24	98	138	98	221	13	2	158	73	5	21	22	16	22	15	18	19	21	28	15	21	18			
II.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.		17	5	1	1	1	1	1	1	1	1	1	1	1	1	1	13	4	16	10	6	1	2	1	16	1	1	10	6	1	2	1	3	1	1	3	1	1	2	1	2	
Group Total		17	5	1	1	1	1	1	1	1	1	1	1	1	1	1	13	4	16	10	6	1	2	1	16	1	1	10	6	1	2	1	3	1	1	3	1	1	2	1	2	
61. Meningitis		2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13	4	16	10	6	1	2	1	16	1	1	10	6	1	2	1	3	1	1	3	1	1	2	1	2	
63. Other diseases of the spinal cord		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13	4	16	10	6	1	2	1	16	1	1	10	6	1	2	1	3	1	1	3	1	1	2	1	2	
64. Cerebral hæmorrhage, apoplexy		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13	4	16	10	6	1	2	1	16	1	1	10	6	1	2	1	3	1	1	3	1	1	2	1	2	
66. Paralysis without specified cause		5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20	8	24	16	10	6	1	2	1	16	1	1	10	6	1	2	1	3	1	1	3	1	1	2	1	2
68. Other forms of mental alienation		2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13	4	16	10	6	1	2	1	16	1	1	10	6	1	2	1	3	1	1	3	1	1	2	1	2	
69. Epilepsy		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13	4	16	10	6	1	2	1	16	1	1	10	6	1	2	1	3	1	1	3	1	1	2	1	2	
71. Convulsions of infants		5	4	1	1	1	1	1	1	1	1	1	1	1	1	1	13	4	16	10	6	1	2	1	16	1	1	10	6	1	2	1	3	1	1	3	1	1	2	1	2	

ONTARIO—Continued.

[illegible]

OFFICIAL ENGLISH TRANSLATION.
DISEASES AND CAUSES OF DEATH.

Number of Column.

Total.

Grand Total	412
I.—GENERAL DISEASES.	
Group Total	62
1. Typhoid fever	1
6. Measles	1
8. Whooping cough	4
9. Diphtheria and croup	1
10. Influenza	10
14. Dysentery	2
18. Erysipelas	1
20. Purulent infection and septicæmia	1
28. Tuberculosis of the lungs	22
29. Acute miliary tuberculosis	1
30. Tuberculous meningitis	1
32. Pott's disease	1
33. White swelling	1
39. Cancer and other malignant tumors of the buccal cavity	1
40. Cancer and other malignant tumors of the stomach, liver	6
41. Cancer and other malignant tumors of the peritoneum, intestines, rectum	1
42. Cancer and other malignant tumors of the female genital organs	1
43. Cancer and other malignant tumors of the breast	2
45. Cancer and other malignant tumors of other organs or of organs not specified	6
46. Other tumors (tumors of the female genital organs excepted)	1
48. Chronic rheumatism and gout	1
50. Diabetes	1
51. Exophthalmic goitre	1
53. Leucæmia	1
54. Anæmia, chlorosis	6
56. Alcoholism (acute or chronic)	1

Total.	Ages.												Sex.		Nativity.		Social Con.		Months.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
													Male.	Female.		Canada.	Foreign.	Not stated.	Single.	Married.	Not stated.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
	Under 1.	1.	2.	3.	4.	5-9.	10-14.	15-19.	20-29.	30-39.	40-49.	50-59.										60-69.	70-79.	80 and over.	Not stated.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
1	2	3	4	5	6	7	8	9	10	15	21	24	68	99	1	215	197	16	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26</

III.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.

[illegible]

OXFORD—Concluded.

Number of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
VII.—THE PUERPERAL STATE.																																									
Group Total		3	1	2	3	2	1	3	2	1
134. Accidents of pregnancy		1	1	1	1	1	1
137. Puerperal septicæmia		2	1	1	2	1	1	2	1
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.																																									
Group Total		3	2	1	2	1	3	2	1	1
142. Gangrene		1	1	1
144. Acute abscess		2	2	1	2
IX.—DISEASES OF THE BONES AND OF THE ORGANS OF LOCOMOTION.																																									
Group Total		2	1	2	2
146. Diseases of the bones (tuberculosis excepted).		1	1	1
147. Diseases of the joints (tuberculosis and rheumatism excepted)		1	1	1
X.—CONGENITAL MALFORMATIONS.																																									
Group Total		2	2	2	2
150. Congenital malformations (still-births not included)		2	2	2	2
XI.—DISEASES OF EARLY INFANCY.																																									
Group Total		25	25	15	10	25	25
151. Congenital debility, icterus, and sclerema		25	25	15	16	25	25
154. XII.—OLD AGE.																																									
Group Total		65	35	32	30	54	1	5	59	1	7	3	9	3	3	4	4	5	6	5	7

XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.

Group Total

- 157. Suicide by hanging or strangulation
- 157. Burns (conflagration excepted)
- 172. Traumatism by fall
- 175. Traumatism by other crushing.
 - (a) Railroad
 - (b) Street car
 - (c) Automobile
 - (d) Other crushing
- 181. Electricity (lightning excepted)
- 186. Other external violence

Group Total

188. Sudden death

STILL-BIRTHS.

Not included in totals

XIV.—ILL-DEFINED DISEASES.

Group Total

188. Sudden death

Not included in totals

Part III.—DISEASES OF THE CIRCULATORY SYSTEM.

Group Total

79. Organic diseases of the heart

81. Diseases of the arteries, atheroma, aneurysm, etc.

82. Embolism and thrombosis

83. Diseases of the veins (varices, hæmorrhoids, phlebitis, etc.)

85. Hæmorrhage; other diseases of the circulatory system

IV—DISEASES OF THE RESPIRATORY SYSTEM.

Group Total

89. Acute bronchitis
90. Chronic bronchitis
91. Broncho-pneumonia
92. Pneumonia
93. Pleurisy
94. Pulmonary congestion, pulmonary apoplexy
96. Asthma

IV—DISEASES OF THE DIGESTIVE SYSTEM.

Group Total

- 99. Diseases of the mouth and adnexa
- 102. Ulcer of the stomach
- 104. Diarrhoea and enteritis (under 2 years)
- 105. Diarrhoea and enteritis (2 years and over)
- 108. Appendicitis and typhlitis
- 109. Hernias, intestinal obstructions
- 113. Cirrhosis of the liver
- 115. Other diseases of the liver
- 117. Simple peritonitis (non-puerperal)

VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.

Group Total

1119. Acute nephritis	
1120. Bright's disease	

VII.—THE PUERPERAL STATE.

Group Total

136. Other accidents of labor
138. Puerperal albuminuria and convulsions.....

X.—CONGENITAL MALFORMATIONS.

Group Total

150. Congenital malformations (still-births not included)

PARRY SOUND—Concluded.

Number of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38			
XI.—DISEASES OF EARLY INFANCY.																																										
	Group Total	37	37																20	17		37				37																
151.	Congenital debility, icterus, and sclerema	37	37																20	17		37				37																
154.	XII.—OLD AGE.																																									
	Group Total	19																	9	10		10	5	4		18																
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																										
	Group Total	19																	15	4		16	3			12																
157.	Suicide by hanging or strangulation	1																1				1																				
165.	Other acute poisonings	1																1				1																				
167.	Burns (conflagration excepted)	2																2				1																				
169.	Accidental drowning	7																6				7																				
172.	Traumatism by fall	1																1				1																				
175.	Traumatism by other crushing.																																									
	(a) Railroad	2																2				2																				
	(b) Street car																																									
	(c) Automobile																																									
	(d) Other crushing	2																1				1																				
185.	Fractures (cause not specified)	1																1				1																				
186.	Other external violence	2																1				1																				
XIV.—ILL-DEFINED DISEASES.																																										
	Group Total	2																	1	1		2				2																
188.	Sudden death	1																	1																							
189.	Cause of death not specified or ill-defined	1																	1																							
STILL-BIRTHS.																																										
	Not included in totals	11	11																8	3		11																				

CAUSES OF DEATH IN THE COUNTY OF PEEL, 1916.

[illegible]

PEEL—Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
	8													1	5	2		5	3		5	3			1	2											1	1	3	1
66. Paralysis without specified cause																																								
69. Epilepsy	1																																							
70. Convulsions (non-puerperal)																																								
71. Convulsions of infants	1																																							
	31						1		1		1	3	4	5	10	6		17	14		22	9		3	28		3	4	1	2	4	4	5	3	2	2	1			
	1																																							
78. Acute endocarditis																																								
79. Organic diseases of the heart	21							1									10	11			14	7		1																
81. Diseases of the arteries, aneurysm, etc.	9											1	1	2	4	1	6	3			7	2																		
	36	1	3	2							2	3	2	5	6	6		31	15		26	5	1	19	17		6	4	1	6	3	2	1	1	4	4	1			
	3																																							
89. Acute bronchitis																																								
90. Chronic bronchitis	7																5	2		6			3																	
91. Broncho-pneumonia	3																3																							
92. Pneumonia	18										2	2	1	2	5		8	16		12	6																			
93. Pleurisy	2																1																							
94. Pulmonary congestion, pulmonary apoplexy	2																1																							
96. Asthma	1																1																							
	11	2		1							1	1	2	1	1	2		6	5		6	5																		
	1																																							
100. Diseases of the pharynx																																								
104. Diarrhoea and enteritis (under 2 years)	2																																							
108. Appendicitis and typhilitis	2																																							
109. Hernias, intestinal obstructions	2																																							
113. Cirrhosis of the liver	1																																							
115. Other diseases of the liver	2																																							
117. Simple peritonitis (non-puerperal)	1																																							
	16	1								3			2	3	6	1		11	5		15	1																		
	2																																							
119. Acute nephritis																																								
120. Bright's disease	9																																							
122. Other diseases of the kidneys and adnexa	1									2																														
123. Calculi of the urinary passages	1																																							
124. Diseases of the bladder	1									1																														
126. Diseases of the prostate	2																																							

VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.

Group Total

142. Gangrene

XI.—DISEASES OF EARLY INFANCY.

Group Total

151. Congenital debility, icterus, and sclerema

154. XII.—OLD AGE.

Group Total

XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.

Group Total

157. Suicide by hanging or strangulation
167. Burns (conflagration excepted)
168. Absorption of deleterious gases (conflagration excepted)
169. Accidental drowning
172. Traumatism by fall
175. Traumatism by other crushing.
(a) Railroad
(b) Street car
(c) Automobile
(d) Other crushing
185. Fractures (cause not specified)

STILL-BIRTHS.

Not included in totals

3	3	1	1	1	2	1	3	1	2	1	1	2	2	2	2	1	1	2	2
3	3	1	1	1	2	1	3	1	2	1	1	2	2	2	2	1	1	2	2
18	18	10	8	18	10	8	18	18	18	18	18	18	18	18	18	18	18	18	18
18	18	10	8	18	10	8	18	18	18	18	18	18	18	18	18	18	18	18	18
20	20	8	12	11	9	5	15	1	3	4	2	2	2	2	2	2	2	2	2
15	15	11	4	11	2	6	6	1	1	4	1	4	4	4	4	4	4	4	4
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	3	2	1	3	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15	15	10	5	15	15	5	15	1	2	3	1	2	2	2	2	2	2	2	2

CAUSES OF DEATH IN THE COUNTY OF PERTH, 1916 (STRATFORD NOT INCLUDED).

OFFICIAL ENGLISH TRANSLATION.
DISEASES AND CAUSES OF DEATH.

DISEASES AND CAUSES OF DEATH.	Total.	Ages.													Sex.			Nativity.			Social Con.			Months.																
		Under 1.	1.	2.	3.	4.	5-9.	10-14.	15-19.	20-29.	30-39.	40-49.	50-59.	60-69.	70-79.	80 and over.	Not stated.	Male.	Female.	Not stated.	Canada.	Foreign.	Not stated.	Single.	Married.	Not stated.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
1	368	44	5	3	1	1	1	2	8	7	12	8	12	14	12	8	2	198	170	253	112	3	123	242	3	33	37	32	27	29	27	31	32	33	34	35	36	37	38
Grand Total	91	3	1	1	1	2	2	8	7	12	8	12	14	12	8	2	41	50	.....	69	22	.....	37	53	1	6	9	10	10	3	10	9	6	10	7	6	8		
1. Typhoid fever	1	1											1					1																						
9. Diphtheria and croup	4	4				1	2										2	2		4	4		4																	
10. Influenza	16	1											1	1	6		4	5		2	7		1																	
14. Dysentery	1	1																1		1																				
20. Purulent infection and septicæmia	2													1	1			2		1																				
28. Tuberculosis of the lungs	30	2					7	5	11	1	5	1	1	1			16	14		27	3		19	11	2	3	2	3	5	1	4	1	2	4	1	2	2			
30. Tuberculous meningitis	3																2	1		3			3																	
31. Abdominal tuberculosis	1	1															1	1		1			1																	
32. Pott's disease	1																			1																				
29. Cancer and other malignant tumors of the buccal cavity	1																	1		1																				
40. Cancer and other malignant tumors of the stomach, liver	2											1	4	2			4	3		3	4		1		6	1														
41. Cancer and other malignant tumors of the peritoneum, intestines, rectum	1											1					1			1					1															
42. Cancer and other malignant tumors of the female genital organs	2												1					2		2					2															
43. Cancer and other malignant tumors of the breast	4												1				1	3		4					1	3														
45. Cancer and other malignant tumors of other organs or of organs not specified	13	1										1	3	5	3		5	8		8					9	1														
50. Diabetes	4											1	1				2	2		2					3															
53. Leucæmia	1																1			1					1															
54. Anæmia, chlorosis	6											1	1	1			2	4		6					6															
I.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.	49	7	1	.....	1	1	2	.....	2	.....	2	6	7	17	4	1	22	27	.....	35	14	.....	17	32	.....	4	3	8	3	4	3	5	1	2	3	6	7		
Group Total	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
60. Encephalitis	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
61. Meningitis	7	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
62. Locomotor ataxia	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
63. Other diseases of the spinal cord	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
64. Cerebral hæmorrhage, apoplexy	21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

III.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.

	49	7	1	..	1	2	....	2	..	6	7	17	4	1	22	27	....	35	14	....	17	32	....	4	3	8	3	4	5	1	2	3	6	7		
Group Total																																				
60. Encephalitis	2							1							2		....	2	....	....	1	1	....	1	....	1	....	1	....	1	....	1	....	1	....
61. Meningitis	7	2	1		1	1		1							1	6	....	7	....	....	7	....	1	....	1	....	2	....	2	....	1	....	1	....	1	....
62. Locomotor ataxia	1														1	....	....	1	....	....	....	....	1	....	1	....	1	....	1	....	1	....	1	....	1	....
63. Other diseases of the spinal cord	2	1													2	....	....	1	....	1	1	....	1	....	1	....	1	....	1	....	1	....	1	....	1	....
64. Cerebral hæmorrhage, apoplexy	21									1	6	10	4		11	10	....	12	9	....	2	19	....	1	5	2	1	1	....	1	3	3	4			

PERTH—Concluded.

Number of Column.		1	- 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.																																								
Group Total		3													2	1		2	1			3				3								1		1	1			
142. Gangrene		3													2	1		2	1			3				3								1		1	1			
X.—CONGENITAL MALFORMATIONS.																																								
Group Total		3	3															2	1			3				3					1		1		1					
150. Congenital malformations (still-births not included)		3	3															2	1			3				3					1		1		1					
XI.—DISEASES OF EARLY INFANCY.																																								
Group Total		23	23															16	7			23				23			2	3	1	2	1	2	1	1	4	4	1	1
151. Congenital debility, icterus, and sclerema		22	22															15	7			22				22			2	2	1	2	1	2	1	1	4	4	1	1
153. Lack of care		1	1															1				1				1														
XII.—OLD AGE.																																								
Group Total		38													3	11	24	22	16			19	19			2	36			4	6	2	2	2	3	3	1	4		5
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																								
Group Total		16		2				1	1				3	1	4	2	2	12	4		12	4			6	10		2	2		1	1	3	1	1	2	1	1	1	
157. Suicide by hanging or strangulation		1																1			1				1									1						
165. Other acute poisonings		1		1				1										1			1				1									1						
172. Traumatism by fall		2												1	1			2			2				1										1					
174. Traumatism by machines		1												1				1			1				1															
175. Traumatism by other crushing.																																								
(a) Railroad		3		1									1	1				2	1		2	1			1	2		1					1		1					
(b) Street car																																								
(c) Automobile																																								
(d) Other crushing																																								
176. Injuries by animals		1												1				1			1																			
185. Fractures (cause not specified)		4											1	1	1	1		2	2		3	1			4								1		1					
186. Other external violence		3											1	1		1		2	1		1	2			2	1							1		1					
STILL-BIRTHS.																																								
Not included in totals		17	17															9	8		17			17				1	1	1	3		2	4	1	2	1			

PRINCE EDWARD—Continued.

[illegible]

VII.—THE PUERPERAL STATE.									
Group Total	1	2	3	4	5	6	7	8	9
137. Puerperal septicæmia	1	1	1	1	1	1	1	1	1
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.									
Group Total	3	1	2	1	2	1	3	1	1
142. Gangrene	3	1	1	2	1	2	3	1	1
X.—CONGENITAL MALFORMATIONS.									
Group Total	1	1	1	1	1	1	1	1	1
150. Congenital malformations (still-births not included)	1	1	1	1	1	1	1	1	1
XI.—DISEASES OF EARLY INFANCY.									
Group Total	7	7	4	3	4	7	7	3	1
151. Congenital debility, icterus, and sclerema	7	7	4	3	4	7	7	3	1
XII.—OLD AGE.									
Group Total	36	6	30	20	16	26	7	3	1
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.									
Group Total	5	1	1	2	3	5	5	1	1
165. Other acute poisonings	1	1	1	1	1	1	1	1	1
167. Burns (conflagration excepted)	2	1	1	1	2	2	2	1	1
178. Excessive cold	1	1	1	1	1	1	1	1	1
185. Fractures (cause not specified)	1	1	1	1	1	1	1	1	1
XIV.—ILL-DEFINED DISEASES.									
Group Total	1	1	1	1	1	1	1	1	1
189. Cause of death not specified or ill-defined	1	1	1	1	1	1	1	1	1
STILL-BIRTHS.									
Not included in totals	12	19	1	7	5	12	12	2	1

CAUSES OF DEATH IN THE COUNTY OF SIMCOE, 1916 (BARRIE, COLLINGWOOD, MIDLAND, ORILLIA, NOT INCLUDED).

OFFICIAL ENGLISH TRANSLATION.

[illegible]

SIMCOE—Continued.

Number of Column.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
II.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Group Total																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
60. Encephalitis	85	11	2	1	1	6	4	1	6	3	5	8	10	22	5	43	46	37	2	6	11	8	9	5	5	2	5	12	3	8	11																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

CAUSES OF DEATH IN THE COUNTIES OF STORMONT, DUNDAS AND GLENGARRY, 1916 (CORNWALL NOT INCLUDED).

OFFICIAL ENGLISH TRANSLATION.
DISEASES AND CAUSES OF DEATH.

[illegible]

STORMONT, DUNDAS AND GLENGARRY—Concluded.

[illegible]

CAUSES OF DEATH IN THE DISTRICT OF TIMISKAMING, 1916 (COBALT NOT INCLUDED).

OFFICIAL ENGLISH TRANSLATION.
DISEASES AND CAUSES OF DEATH.

[illegible]

TEMISKAMING—Concluded.

[illegible]

VICTORIA—Continued.

		Number of Column.																																							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
III.—DISEASES OF THE CIRCULATORY SYSTEM.																																									
	Group Total	41										1	4	5	9	16	6		20	21		26	15			7	34		6	1	8	1	3	6	2	3	5	1	2	3	
79.	Organic diseases of the heart	30										1	2	3	6	14	4		12	18		20	10			5	25		6	1	3	1	3	6	2	2	3	1	1	1	
81.	Diseases of the arteries, aneurysm, etc.	9												2	3	2	2		7	2		4	5			2	7				5						2				
82.	Embolism and thrombosis	2										2							1	1								2									1				
IV.—DISEASES OF THE RESPIRATORY SYSTEM.																																									
	Group Total	26	5	1						1		1	3	3	4	3	5		12	14		22	4			10	16		7	1	2	5	1	3			1	2		4	
89.	Acute bronchitis	1	1																1			1				1															
90.	Chronic bronchitis	2																	1			2				1															
91.	Broncho-pneumonia	17	4	1						1					1				1			1					1														
92.	Pneumonia	1										2	1	2	2	4			9	8		14	3			7	10		6	2	3		3					2		1	
95.	Gangrene of the lung	1																	1			1					1														
96.	Asthma	3										1	1						1	2		2	1			1	2		1												
98.	Other diseases of the respiratory system (tuberculosis excepted)	1																		1		1					1														
V.—DISEASES OF THE DIGESTIVE SYSTEM.																																									
	Group Total	16	2	1				1	2		2	1			2	4	1		7	9		10	6			9	6		1		1	1		1		3	3		4		3
102.	Ulcer of the stomach	1																	1			1				1															
103.	Other diseases of the stomach (cancer excepted)	3	2									1							1	2		2	1			2	1										1				
104.	Diarrhoea and enteritis (under 2 years)	1																			1				1																
108.	Appendicitis and typhilitis	3																	1	2		1				1															
109.	Hernias, intestinal obstructions	3																	2	1		1				2															
115.	Other diseases of the liver	1																	1							1															
117.	Simple peritonitis (non-puerperal)	4										1							1	3		4				2	1														
VI.—NON-VEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.																																									
	Group Total	9										1	1	1	2	1	3		4	5		4	5				9		1	2	1		1		2	1					
120.	Bright's disease	7																	2	5		3	4																		
122.	Other diseases of the kidneys and adnexa	1										1							1			1					1														
126.	Diseases of the prostate	1																	1								1														
VII.—THE PUERPERAL STATE.																																									
	Group Total	2										2										2																			
36.	Other accidents of labor	2										2										2																			

ii.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.	
Group Total	59
60. Encephalitis	1
61. Meningitis	2
62. Other diseases of the spinal cord	1
63. Cerebral hemorrhage, apoplexy	23
64. Paralysis without specified cause	12
65. Epilepsy	2
66. Convulsions of infants	15
67. Other diseases of the nervous system	3
III.—DISEASES OF THE CIRCULATORY SYSTEM.	
Group Total	49
78. Acute endocarditis	2
79. Organic diseases of the heart	28
80. Angina pectoris	5
81. Diseases of the arteries, aneurysm, etc.	12
82. Embolism and thrombosis	2
IV.—DISEASES OF THE RESPIRATORY SYSTEM.	
Group Total	52
89. Acute bronchitis	10
90. Chronic bronchitis	7
91. Broncho-pneumonia	8
92. Pneumonia	26
93. Pulmonary congestion, pulmonary apoplexy	1
V.—DISEASES OF THE DIGESTIVE SYSTEM.	
Group Total	28
101. Diseases of the œsophagus	1
102. Ulcer of the stomach	1
103. Other diseases of the stomach (cancer excepted)	4
104. Diarrhoea and enteritis (under 2 years)	10
105. Appendicitis and typhlitis	3
106. Hernias, intestinal obstructions	1
107. Diseases of the intestines	1
108. Biliary calculi	2
109. Other diseases of the liver	2
110. Simple peritonitis (non-puerperal)	3
VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.	
Group Total	12
119. Acute nephritis	2
120. Bright's disease	8
121. Diseases of the bladder	1
122. Diseases of the prostate	1

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Number of Column.		XII.—Old Age.																											
		Group Total																											
		XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																											
		Group Total																											
154.																													
157.	Suicide by hanging or strangulation																												
165.	Other acute poisonings																												
167.	Burns (conflagration excepted)																												
169.	Accidental drowning																												
172.	Traumatism by fall																												
174.	Traumatism by machines																												
175.	Traumatism by other crushing.																												
	(a) Railroad																												
	(b) Street car																												
	(c) Automobile																												
	(d) Other crushing																												
178.	Excessive cold																												
185.	Fractures (cause not specified)																												
186.	Other external violence																												
	XIV.—ILL-DEFINED DISEASES.																												
	Group Total																												
188.	Sudden death																												
189.	Cause of death not specified or ill-defined																												
	STILL-BIRTHS.																												
	Not included in totals																												

CAUSES OF DEATH IN THE CITY OF BELLEVILLE, 1916.

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X.—MALFORMATIONS.	
Group Total	1
150. Congenital malformations (still-births not included)	1
XI.—DISEASES OF EARLY INFANCY.	
Group Total	12
151. Congenital debility, icterus, and sclerema	12
154. XII.—OLD AGE.	18
Group Total	12
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.	
Group Total	1
155. Suicide by poison	1
160. Suicide by cutting or piercing instruments	1
167. Burns (conflagration excepted)	3
169. Accidental drowning	1
171. Traumatism by cutting or piercing instruments.	2
175. Traumatism by other crushing (vehicles, rail-road, landslides, etc.)	1
180. Lightning	1
181. Electricity (lightning excepted)	1
185. Fractures (cause not specified)	1
Not included in totals	16

CHATHAM—Continued.

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FORT WILLIAM—Concluded.

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GALT—Continued.

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HAMILTON—Concluded.

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XI.—DISEASES OF EARLY INFANCY.																																						
134	134																81	53	134					134														
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XII.—OLD AGE.																																						
45																	15	30	14	31				3	41													
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																						
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6																	6							5	1													

CAUSES OF DEATH IN THE CITY OF KITCHENER, 1916.

OFFICIAL ENGLISH TRANSLATION.
DISEASES AND CAUSES OF DEATH.

[illegible]

KITCHENER—Concluded.

[illegible]

NIAGARA FALLS—Continued.

Number of Column.																																							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
5												2	3				3	2		3	2				5				1	1	1	1	1					1	
1								1										1		1				1															
16	6	1	2					1					3	3		7	9		13	3				9	6	1	1	1	2	1	4	4		1			2		
1	1																1		1				1														1		
6	1	1	2										2		2	1	5		5	1			4	2			1	1	1	1	2						1		
7	3							1					2	1		5	2		6	1			3	3	1		1	1	1	3	1						1		
1	1														1		1		1				1																
17	7					1		2	1			2	2	1	1		6	11		14	3			9	8		2		1	1	1	1	1	9	1			1	
1																		1																					
7																	3	4		7				1			1												
3								1								1		2		3																		7	
1																	1																						
3								1									2		2																			1	
1																		1		1																		1	
1																																							
9										2	1		2	3	1		6	3		6	3			2	7		1	2		2								1	2
9											2	1	2	3	1		6	3		6	3			2	7		1	2		2								1	2
1											1							1		1				1															
1											1								1					1															
2	1															1	2		2				1															1	
1																			1																				
1																																							
			</																																				

XI.—DISEASES OF EARLY INFANCY.

Group	Total
1	100
2	100
3	100
4	100
5	100
6	100
7	100
8	100
9	100
10	100
11	100
12	100
13	100
14	100
15	100
16	100
17	100
18	100
19	100
20	100
21	100
22	100
23	100
24	100
25	100
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43	100
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82	100
83	100
84	100
85	100
86	100
87	100
88	100
89	100
90	100
91	100
92	100
93	100
94	100
95	100
96	100
97	100
98	100
99	100
100	100

151. Congenital debility, icterus, and sclerema

XII.—OLD AGE.

Group	Total
1	100
2	100
3	100
4	100
5	100
6	100
7	100
8	100
9	100
10	100
11	100
12	100
13	100
14	100
15	100
16	100
17	100
18	100
19	100
20	100
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83	100
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87	100
88	100
89	100
90	100
91	100
92	100
93	100
94	100
95	100
96	100
97	100
98	100
99	100
100	100

XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.

Group	Total
1	100
2	100
3	100
4	100
5	100
6	100
7	100
8	100
9	100
10	100
11	100
12	100
13	100
14	100
15	100
16	100
17	100
18	100
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90	100
91	100
92	100
93	100
94	100
95	100
96	100
97	100
98	100
99	100
100	100

163. Other suicides
167. Burns (conflagration excepted)
169. Accidental drowning
173. Traumatism in mines and quarries
175. Traumatism by other crushing (vehicles, rail-
road, landslides, etc.)
185. Fractures (cause not specified)

STILL-BIRTHS.

Not included in totals

[illegible]

CAUSES OF DEATH IN THE CITY OF OTTAWA, 1916.

OFFICIAL ENGLISH TRANSLATION. DISEASES AND CAUSES OF DEATH.		Ages.																Sex.		Nativity.		Social Con.			Months.																											
		Under 1.		1.		2.		3.		4.		5-9.		10-14.		15-19.		20-29.		30-39.		40-49.		50-59.		60-69.		70-79.		80 and over.		Male.		Female.		Not stated.		Canada.		Foreign.		Not stated.		Single.		Married.		Not stated.				
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27	27-28	28-29	29-30	30-31	31-32	32-33	33-34	34-35	35-36	36-37	37-38	38-39	39-40	40-41	41-42	42-43	43-44	44-45	45-46	46-47	47-48	48-49	49-50	
Total.	5-49	82	28	20	14	36	25	50	98	136	116	146	149	182	110	1	907	834	1	194	225	1442	281	19	1007	722	13	180	144	152	168	136	100	165	157	135	141	110	145													
1	1742	58	19	12	8	5	20	12	30	43	51	39	42	38	35	7	194	225	1	194	225	1442	281	19	1007	722	13	180	144	152	168	136	100	165	157	135	141	110	145													
Grand Total		419																	419																	419																
Group Total		18																	18																	18																
1. Typhoid fever	18																	18																	18																	
6. Measles	15																	15																	15																	
8. Whooping cough	25																	25																	25																	
9. Diphtheria and croup	23																	23																	23																	
10. Influenza	12																	12																	12																	
14. Dysentery	5																	5																	5																	
18. Erysipelas	3																	3																	3																	
20. Purulent infection and septicaemia	13																	13																	13																	
24. Tetanus	1																	1																	1																	
28. Tuberculosis of the lungs	109																	109																	109																	
29. Acute miliary tuberculosis	9																	9																	9																	
30. Tuberculous meningitis	7																	7																	7																	
31. Abdominal tuberculosis	6																	6																	6																	
33. White swelling	1																	1																	1																	
34. Tuberculosis of other organs	2																	2																	2																	
36. Rickets	7																	7																	7																	
37. Syphilis	10																	10																	10																	
38. Gonococcus infection	2																	2																	2																	
39. Cancer and other malignant tumors of the buccal cavity	4																	4																	4																	
40. Cancer and other malignant tumors of the stomach, liver	26																	26																	26																	
41. Cancer and other malignant tumors of the peritoneum, intestines, rectum	11																	11																	11																	
42. Cancer and other malignant tumors of the female genital organs	11																	11																	11																	
43. Cancer and other malignant tumors of the breast	3																	3																	3																	
44. Cancer and other malignant tumors of the skin	1																	1																	1																	
45. Cancer and other malignant tumors of other organs and of organs not specified	22																	22																	22																	
46. Other tumors (tumors of the female genital organs excepted)	1																	1																	1																	
47. Acute articular rheumatism	7																	7																	7																	

OTTAWA—Continued.

		Number of Column.																																				
V.—DISEASES OF THE DIGESTIVE SYSTEM.																																						
Group Total																																						
223	Diseases of the mouth and adnexa	133	15	3	2	1	2	5	6	11	13	13	10	7	9	3	..	126	97	...	207	14	2	171	50	2	7	9	13	17	14	33	49	27	14	11	12	
1	Diseases of the pharynx	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	Ulcer of the stomach	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	..	3	1	..	..	3	1	..	..	..	..	..	..	..	..	..	..	..	..
103	Other diseases of the stomach (cancer excepted)	5	3	..	1	..	1	..	1	..	1	2	2	1	3	..	..	2	10	9	..	17	2	..	12	7	..	2	2	1	2	4	2	..	..	..	..	..
124	Diarrhoea and enteritis (under 2 years)	114	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	73	51	..	134	..	..	124	..	..	3	1	3	2	8	6	23	42	21	7	6	3
9	Diarrhoea and enteritis (2 years and over)	..	..	3	1	1	1	..	1	..	1	..	2	..	..	..	..	5	4	..	9	..	..	8	1	..	..	2	..	..	..	..	..	..	..	..	..	..
108	Appendicitis and typhilitis	..	1	1	1	1	2	3	1	2	..	1	..	1	..	..	..	10	8	..	16	2	..	13	5	..	1	2	1	1	3	..	4	1	1	..	1	3
109	Hernias, intestinal obstructions	2	..	..	..	..	1	3	2	1	..	..	..	3	1	..	..	5	8	..	9	2	2	5	7	1	..	1	..	..	..	..	..	..	..	..	..	..
110	Diseases of the intestines	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	..	3	..	..	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..
113	Cirrhosis of the liver	..	..	..	..	..	..	..	..	1	2	2	..	4	2	2	..	5	8	..	10	3	..	1	12	..	..	1	1	4	2	1	..	..	..	..	..	..
9	Other diseases of the liver	..	..	..	..	..	..	..	..	..	1	3	3	1	1	..	..	6	3	..	7	2	..	3	6	..	..	1	3	..	1	..	2	..	..	..	..	..
10	Simple peritonitis (non-puerperal)	..	..	..	..	..	1	1	2	3	1	2	..	..	..	..	..	6	4	..	8	2	..	2	8	..	..	1	2	1	2	1	..	1	1	1	..	..
VI.—NON-VENTERAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.																																						
86	Group Total	11	4	..	..	..	1	..	..	4	8	8	18	12	13	6	1	44	42	...	71	15	...	28	58	..	9	2	10	7	8	6	8	5	10	5	8	6
21	Acute nephritis	10	4	..	..	..	1	..	..	..	1	1	3	1	..	..	..	11	10	..	18	3	..	15	6	..	4	3	2	1	1	3	..	4	..	1	2	1
48	Bright's disease	..	..	..	..	..	..	..	3	4	4	13	8	10	5	1	..	23	25	..	38	10	..	12	36	..	4	2	4	6	5	4	4	5	3	4	3	..
4	Other diseases of the kidneys and adnexa	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	Calculi of the urinary passages	..	..	..	..	..	..	..	..	1	2	1	1	..	..	..	..	2	2	..	3	1	..	..	4	..	1	..	1	..	..	..	..	..	..	..	..	..
4	Diseases of the bladder	..	..	..	..	..	..	..	..	1	..	1	1	1	..	..	..	2	2	..	3	1	..	..	4	..	4	..	1	..	2	..	..	..	..	1	1	..
4	Diseases of the prostate	..	..	..	..	..	..	..	..	..	..	..	..	2	2	1	..	4	1	..	3	1	..	..	5	..	1	..	1	1	1	1	1	1	1	1	1	..
5	Diseases of the uterus (non-cancerous)	1	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	1	..	..	1	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..
1	Uterine tumor (non-cancerous)	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	1	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..
1	Cysts and other tumors of the ovary	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..
1	Salpingitis and other diseases of the female genital organs	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..
VII.—THE PUERPERAL STATE.																																						
12	Group Total	..	..	..	..	..	1	..	..	6	4	1	..	..	..	..	..	12	..	..	11	1	..	..	12	..	..	2	2	1	3	..	3	1	..	..	..
1	Accidents of pregnancy	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..
1	Other accidents of labor	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	1	..	..	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..
7	Puerperal septicaemia	..	..	..	..	..	..	..	..	1	3	2	1	..	..	..	..	7	..	..	6	1	..	..	7	..	1	..	1	2	2	1	1	1	1	1	1	..
2	Puerperal albuminuria and convulsions	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	2	..	..	2	..	..	..	2	..	1	..	1	..	..	..	..	..	..	..	..	..
1	Puerperal phlegmasia alba dolens, embolus, sudden death	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.																																						
13	Group Total	4	1	..	1	..	..	..	..	..	2	1	..	1	3	..	..	4	9	..	12	1	..	7	6	..	1	2	1	2	1	1	1	..	2	1	1	1
7	Gangrene	..	..	..	..	..	..	..	..	..	1	..	..	..	1	3	..	2	5	..	6	1	..	2	5	..	1	1	1	..	1	1	1	1	1	1	1	1
5	Acute abscess	3	1	..	..	..	..	..	..	..	1	1	..	..	..	..	..	2	3	..	3	..	..	1	1	..	1	1	2	1	..	1	1	1	1	1	1	1
1	Other diseases of the skin and adnexa	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..

PETERBOROUGH—Concluded.

[illegible]

OFFICIAL ENGLISH TRANSLATION.
DISEASES AND CAUSES OF DEATH.

Number of Column.

Total.

Grand Total

I.—GENERAL DISEASES.

Group Total

1. Typhoid fever
6. Measles
8. Whooping cough
20. Purulent infection and septicaemia
28. Tuberculosis of the lungs
30. Tuberculous meningitis
31. Abdominal tuberculosis
40. Cancer and other malignant tumors of the stomach, liver
43. Cancer and other malignant tumors of the breast
45. Cancer and other malignant tumors of other organs and of organs not specified
47. Acute articular rheumatism
48. Chronic rheumatism and gout
50. Diabetes
53. Leucæmia
54. Anæmia, chlorosis

II.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.

Group Total

64. Cerebral hæmorrhage, apoplexy
66. Paralysis without specified cause
71. Convulsions of infants
74. Other diseases of the nervous system
76. Diseases of the ears

Total.	Ages.										Sex.		Nativity.			Social Con.		Months.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
											Male.	Female.		Canada.	Foreign.	Not stated.	Single.	Married.	Not stated.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
	Under 1.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
157	45	10	6	3	3	1	1	2	1	4	3	3	6	9	6	1	1	6	9	14	9	6	...	87	70	...	100	55	2	92	63	2	15	10	12	17	19	13	13	15	14	5	14	3	10	14	2	45	157																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
45	4	6	2	2	3	1	1	2	1	4	3	3	6	9	6	1	1	19	26	27	16	2	26	19	...	4	2	5	4	5	6	5	3	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4	2	4	1	4</

PORT ARTHUR—Continued.

[illegible]

ST. CATHARINES—Concluded.

Number of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
X.—MALFORMATIONS.																																									
	Group Total	1	1															1		1		1				1															
150.	Congenital malformations (still-births not included)	1	1														1		1			1			1																
XI.—DISEASES OF EARLY INFANCY.																																									
	Group Total	31	31															16	15		31		31		31		31		1	1	4	3	1	5	2	1	6	3	1	3	
151.	Congenital debility, icterus, and sclerema	31	31															16	15		31		31		31		31		1	1	4	3	1	5	2	1	6	3	1	3	
154.	XII.—OLD AGE.																																								
	Group Total	19															4	15	10	9		8	1					1	18												
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																									
	Group Total	18	1	1	1	2	1	2	3	3	1					1	2	10	8		11	7				8	10														
155.	Suicide by poison	1																									1														
156.	Burns (conflagration excepted)	6			1	1	2		1	1								3	3		3	3				4	2														
157.	Absorption of deleterious gases (conflagration excepted)	1	1																								1														
159.	Accidental drowning	1																									1														
170.	Traumatism by firearms	2																									1														
175.	Traumatism by other crushing (vehicles, railroad, landslides, etc.)	2																									1														
185.	Fractures (cause not specified)	4																2	2		2	2				1	3														
186.	Other external violence	1																1									1														
XIV.—ILL-DEFINED DISEASES.																																									
	Group Total	2														1	1			2		2					2														
188.	Sudden death	2																									2														
STILL-BIRTHS.																																									
	Not included in totals	30	30															16	14		30																				

CAUSES OF DEATH IN THE CITY OF ST. THOMAS, 1916.

DISEASES AND CAUSES OF DEATH.	Total.	Ages.													Sex.			Nativity.			Social Con.			Months.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
		Under 1.													Male.	Female.	Not stated.	Canada.	Foreign.	Not stated.	Single.	Married.	Not stated.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
		0-1	1.	2.	3.	4.	5.	6.	7-9.	10-14.	15-19.	20-29.	30-39.	40-49.																						50-59.	60-69.	70-79.	30 and over.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Number of Column.		24	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

ST. THOMAS—Continued.

Number of Column.																																					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
64. Cerebral hæmorrhage, apoplexy																																					
66. Paralysis without specified cause																																					
67. General paralysis of the insane																																					
71. Convulsions of infants																																					
III.—DISEASES OF THE CIRCULATORY SYSTEM.																																					
Group Total																																					
78. Acute endocarditis																																					
79. Organic diseases of the heart																																					
80. Angina pectoris																																					
81. Diseases of the arteries, aneurysm, etc.																																					
IV.—DISEASES OF THE RESPIRATORY SYSTEM.																																					
Group Total																																					
87. Diseases of the larynx																																					
89. Acute bronchitis																																					
90. Chronic bronchitis																																					
91. Broncho-pneumonia																																					
92. Pneumonia																																					
96. Asthma																																					
V.—DISEASES OF THE DIGESTIVE SYSTEM.																																					
Group Total																																					
104. Diarrhœa and enteritis (under 2 years)																																					
108. Appendicitis and typhilitis																																					
117. Simple peritonitis (non-puerperal)																																					
VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.																																					
Group Total																																					
119. Acute nephritis																																					
120. Bright's disease																																					
123. Calculi of the urinary passages																																					
130. Other diseases of the uterus																																					
VII.—THE PUERPERAL STATE.																																					
Group Total																																					
135. Puerperal hæmorrhage																																					
137. Puerperal septicæmia																																					
138. Puerperal albuminuria and convulsions																																					

VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.

Group Total

142. Gangrene

X.—MALFORMATIONS.

Group Total

150. Congenital malformations (still-births not included)

XI.—DISEASES OF EARLY INFANCY.

Group Total

151. Congenital debility, icterus, and sclerema

154.

XII.—OLD AGE.

Group Total

XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.

Group Total

159. Suicide by firearms
168. Absorption of deleterious gases (conflagration
excepted)

168. Absorption of deleterious gases (conflagration excepted)

172. Traumatism by fall
175. Traumatism by other causes

road, landslides, etc.)

133. Fractures (cause not specified)

STILL-BIRTHS.

Not included in totals

[illegible]

III.—DISEASES OF THE CIRCULATORY SYSTEM.

III.—DISEASES OF THE CIRCULATORY SYSTEM.					
Group Total	21				
79. Organic diseases of the heart	12	.....	.....	.....	.....
80. Angina pectoris	2	.....	.....	.....	.....
81. Diseases of the arteries, aneurysm. etc.	6	.....	.....	.....	.....
82. Embolism and thrombosis	1	.....	.....	.....	.....
Group Total		.....	.....	.....	.....

IV.—DISEASES OF THE RESPIRATORY SYSTEM.

[illegible]

V.—DISEASES OF THE DIGESTIVE SYSTEM.

[illegible]

VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.

[illegible]

VII.—THE PUERPERAL STATE.

[illegible]

VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.

VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.									
Group Total	2	1	1	1	1	2	2	2	2
142. Gangrene	2	1	1	1	1	2	2	2	2

SARNIA—Concluded.

	Number of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
X.—MALFORMATIONS.																																									
	Group Total	3	3																1	2		3				3								1	1		1				
150.	Congenital malformations (still-births not included)	3	3															1	2		3				3								1	1		1					
XI.—DISEASES OF EARLY INFANCY.																																									
	Group Total	11	11															8	3		11				11								3	2	1	1		1			
151.	Congenital debility, icterus, and sclerema	11	11															8	3		11				11								3	2	1	1		1			
154.	XII.—OLD AGE.																																								
	Group Total	11													2	4	5		4	7		5		6		1	10						1		1	3	2	2	1		
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																									
	Group Total	9						1	1			1	1	1	1	2		6	3		4		5		3		6					1			1			1	4		
165.	Other acute poisonings	1																1			1																				
167.	Burns (conflagration excepted)	3																1		3			3												1						
168.	Absorption of deleterious gases (conflagration excepted)	1																1																		1					
169.	Accidental drowning	1																1																							
186.	Other external violence	3						1	1									3			1		2			2															
XIV.—ILL-DEFINED DISEASES.																																									
	Group Total	1											1					1			1						1														
189.	Cause of death not specified or ill-defined	1																1			1																				
STILL-BIRTHS.																																									
Not included in totals		23	23															14	9		23				23							3	1	1	2	5		5	1	2	1

CAUSES OF DEATH IN THE CITY OF SAULT STE. MARIE, 1916.

OFFICIAL ENGLISH TRANSLATION.
DISEASES AND CAUSES OF DEATH.

[illegible]

SAULT STE. MARIE—Continued.

[illegible]

VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.

[illegible]

TORONTO—Continued.

	Number of Column.																																							
44. Cancer and other malignant tumors of the skin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
45. Cancer and other malignant tumors of other organs or of organs not specified	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
46. Other tumors (tumors of the female genital organs excepted)	121	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
47. Acute articular rheumatism	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
48. Chronic rheumatism and gout	26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
49. Scurvy	13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
50. Diabetes	41	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
51. Exophthalmic goitre	17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
52. Addison's disease	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
53. Leucæmia	11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
54. Anæmia, chlorosis	83	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
55. Other general diseases	27	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
56. Alcoholism (acute or chronic)	19	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
58. Other chronic occupation poisonings	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
59. Other chronic poisonings	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
I.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.																																								
Group Total	616	107	18	5	3	7	3	10	16	40	44	50	73	90	85	62	329	287	268	237	11	247	358	11	68	66	72	48	53	49	52	29	43	39	50	47				
Encephalitis	15	1	4	1	1	1	1	1	1	1	2	1	1	3	1	1	10	5	10	5	10	5	10	5	10	5	10	5	10	5	10	5	10	5	10	5	10	5	10	5
61. Meningitis	79	17	4	3	2	3	7	7	15	10	5	3	1	1	1	1	52	27	63	16	3	16	2	6	11	17	3	5	9	3	1	1	1	1	1	1	1	1	1	1
62. Locomotor ataxia	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7	1	4	3	1	6	1	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
63. Other diseases of the spinal cord	27	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	13	18	9	8	19	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
64. Cerebral hæmorrhage, apoplexy	137	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	87	110	87	105	5	16	18	3	27	23	22	21	14	16	19	7	13	13	12	10				
65. Softening of the brain	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
66. Paralysis without specified cause	82	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	39	43	38	43	1	17	63	2	14	3	11	5	6	4	7	2	10	6	7	7				
67. General paralysis of the insane	44	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34	40	12	29	2	12	29	3	3	4	1	5	4	3	2	3	3	4	6	6				
68. Other forms of mental alienation	15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	11	7	8	1	7	7	1	2	2	1	1	4	1	4	2	2	2	2	2	2	2		
69. Epilepsy	25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11	14	15	8	2	15	10	1	3	2	2	2	1	2	3	1	1	2	4	1	2	1	2	
70. Convulsions (non-puerperal)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
71. Convulsions of infants	81	70	9	1	1	1	1	1	1	1	1	1	1	1	1	1	49	32	80	1	81	1	10	11	6	4	8	7	8	6	4	7	2	1	1	1	1	1	1	
72. Chorea	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	16	24	8	12	20	1	1	2	6	5	3	3	4	1	1	1	1	1	1	1	1	1	
74. Other diseases of the nervous system	32	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	4	7	1	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
76. Diseases of the ears	7	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
III.—DISEASES OF THE CIRCULATORY SYSTEM.																																								

TORONTO—Continued.

		Number of Column.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
VII.—THE PUERPERAL STATE.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
	Group Total	63																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

XIII.--AFFECTIONS PRODUCED BY EXTERNAL CAUSES.

Group Total	.....
155. Suicide by poison	.....
156. Suicide by asphyxia	.....
157. Suicide by hanging or strangulation	.....
158. Suicide by drowning	.....
159. Suicide by firearms	.....
160. Suicide by cutting or piercing instruments	.....
164. Poisoning by food	.....
165. Other acute poisonings	.....
167. Burns (conflagration excepted)	.....
168. Absorption of deleterious gases (conflagration excepted)	.....
169. Accidental drowning	.....
170. Traumatism by firearms	.....
172. Traumatism by fall	.....
174. Traumatism by machines	.....
175. Traumatism by other crushing.	.....
(a) Railroad	.....
(b) Street car	.....
(c) Automobile	.....
(d) Other crushing	.....
176. Injuries by animals	.....
179. Effects of heat	.....
181. Electricity (lightning excepted)	.....
184. Homicide by other means	.....
185. Fractures (cause not specified)	.....
186. Other external violence	.....
XIV.—ILL-DEFINED DISEASES.	.....
Group Total	.....
187. Ill-defined organic disease	.....
188. Sudden death	.....
189. Cause of death not specified or ill-defined	.....
STILL-BIRTHS.	.....
Not included in totals	.....

XIV.—ILL-DEFINED DISEASES.

Group Total	.....
187. Ill-defined organic disease	.....
188. Sudden death	.....
189. Cause of death not specified or ill-defined	.....
STILL-BIRTHS.	
Not included in totals	.....

WOODSTOCK—Continued.

Number of Column.																					
III.—DISEASES OF THE CIRCULATORY SYSTEM.																					
Group Total																					
79. Organic diseases of the heart																					
81. Diseases of the arteries, atheroma, aneurysm, etc.																					
82. Embolism and thrombosis																					
IV.—DISEASES OF THE RESPIRATORY SYSTEM.																					
Group Total																					
90. Chronic bronchitis																					
91. Broncho-pneumonia																					
92. Pneumonia																					
93. Pleurisy																					
94. Pulmonary congestion, pulmonary apoplexy																					
V.—DISEASES OF THE DIGESTIVE SYSTEM.																					
Group Total																					
103. Other diseases of the stomach (cancer excepted)																					
105. Diarrhea and enteritis (2 years and over)																					
108. Appendicitis and typhilitis																					
109. Hernias, intestinal obstructions																					
113. Cirrhosis of the liver																					
115. Other diseases of the liver																					
117. Simple peritonitis (non-puerperal)																					
VI.—NON-VENTERAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.																					
Group Total																					
120. Bright's disease																					
VII.—THE PUERPERAL STATE.																					
Group Total																					
135. Puerperal hæmorrhage																					
136. Other accidents of labor																					
X.—MALFORMATIONS.																					
Group Total																					
150. Congenital malformations (still-births not included)																					

XI.—DISEASES OF EARLY INFANCY.

Group	Total
1	100
2	100
3	100
4	100
5	100
6	100
7	100
8	100
9	100
10	100
11	100
12	100
13	100
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88	100
89	100
90	100
91	100
92	100
93	100
94	100
95	100
96	100
97	100
98	100
99	100
100	100

151. Congenital debility, icterus, and sclerema

154.

XII.—OLD AGE.

Group	Total
1	100
2	100
3	100
4	100
5	100
6	100
7	100
8	100
9	100
10	100
11	100
12	100
13	100
14	100
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90	100
91	100
92	100
93	100
94	100
95	100
96	100
97	100
98	100
99	100
100	100

XIII.---AFFECTIONS PRODUCED BY EXTERNAL CAUSES.

Group	Total
1	100
2	100
3	100
4	100
5	100
6	100
7	100
8	100
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10	100
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13	100
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92	100
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95	100
96	100
97	100
98	100
99	100
100	100

167. Burns (conflagration excepted)
172. Traumatism by fall
175. Traumatism by other crushing (vehicles, rail-
road, landslides, etc.)
185. Fractures (cause not specified)
186. Other external violence

172. Traumatism by fall

175. Traumatism by other crushing (vehicles, railroad, land-slides, etc.)

185. Fractures (cause not specified)

186. Other external violence

XIV.—ILL-DEFINED DISEASES.

Group Total

189. Cause of death not specified or ill-defined . . .

STILL-BIRTHS.

Not included in totals

[illegible]

CAUSES OF DEATH IN THE TOWN OF BARRIE, 1916.

OFFICIAL ENGLISH TRANSLATION.
DISEASES AND CAUSES OF DEATH.

[illegible]

III.—DISEASES OF THE CIRCULATORY SYSTEM.

Group Total

78. Acute endocarditis
79. Organic diseases of the heart
81. Diseases of the arteries, atheroma, aneurysm,
etc.
82. Embolism and thrombosis

IV.—DISEASES OF THE RESPIRATORY SYSTEM.

Group Total

91. Broncho-pneumonia
92. Pneumonia
93. Pleurisy
98. Other diseases of the respiratory system (tuberculosis excepted)

V.—DISEASES OF THE DIGESTIVE SYSTEM.

Group Total

103. Other diseases of the stomach (cancer excepted)

104. Diarrhoea and enteritis (under 2 years)

108. Appendicitis and typhlitis

109. Hernias, intestinal obstructions

117. Simple peritonitis (non-puerperal)

VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.

Group Total

1119. Acute nephritis
1120. Bright's disease

VII.—THE PUERPERAL STATE.

Group Total

136. Other accidents of labor
138. Puerperal albuminuria and convulsions

VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.

Group Total

142. Gangrene
143. Furuncle

X.—MALFORMATIONS.

roup Total

150. Congenital malformations (still-births not included)

[illegible]

BROCKVILLE—Concluded.

Number of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
XI.—DISEASES OF EARLY INFANCY.																																									
Group Total		10	10															9	1	10	10				10					1			1	3	1	2	1	1			
151. Congenital debility, icterus, and sclerema		10	10														9	1			10				10					1			1	3	1	2	1	1			
154. XII.—OLD AGE.																																									
Group Total		8														1	7	4	4	4	4						8					1	2		1		2	1	1		
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																									
Group Total		6		1				1	1		1	1	1					4	2		5	1				2	4				1		1		1			1	2		
160. Suicide by cutting or piercing instruments.		1																1			1						1														
165. Other acute poisonings		1		1																1							1														
169. Accidental drowning		2						1										2			2					2															
175. Traumatism by other crushing (vehicles, rail road, landslides, etc.)		1											1					1									1														
184. Homicide by other means		1																		1							1														
XIV.—ILL-DEFINED DISEASES.																																									
Group Total		2										1			1			1	1		1						2							1							
188. Sudden death		2										1			1			1	1		1						2														
STILL-BIRTHS.																																									
Not included in totals		18	18														10	8		18						18				3	2	4	1	3		1	1	2		1	

COBALT—Concluded.

Number of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
V.—DISEASES OF THE DIGESTIVE SYSTEM.																																									
Group Total		7	5							1	1							2	5		7				6	1									1	2	3				
104. Diarrhœa and enteritis (under 2 years)		5	5															1	4		5				5										1	1	2				
108. Appendicitis and typhlitis		1								1									1		1				1																
109. Hernias, intestinal obstructions		1										1						1			1																				
VII.—THE PUERPERAL STATE.																																									
Group Total		2										1	1							2		1				2										1					
134. Accidents of pregnancy		1										1								1		1				1															
137. Puerperal septicæmia		1										1								1						1															
XI.—DISEASES OF EARLY INFANCY.																																									
Group Total		26	26																15	11		26			26				3	2	2	1	2	2	2	4	4	1	2	1	
151. Congenital debility, icterus, and sclerema		26	26																15	11		26			26				3	2	2	1	2	2	2	4	4	1	2	1	
154. XII.—OLD AGE.																																									
Group Total		1																1	1		1				1																
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																									
Group Total		6	2			1					1	1	1						5	1		5			4	2															
179. Effects of heat.		2	2																1	1		2			2																
181. Electricity (lightning excepted)		1												1				1	1						1																
185. Fractures (cause not specified)		1																1	1		1				1																
186. Other external violence		2				1													2			2			2																
STILL-BIRTHS.																																									
Not included in totals		7	7																6	1		7			7											3	1		1		

COBBOURG—Continued.

[illegible]

XI.—DISEASES OF EARLY INFANCY.

Group	Total
1	100
2	100
3	100
4	100
5	100
6	100
7	100
8	100
9	100
10	100
11	100
12	100
13	100
14	100
15	100
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68	100
69	100
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100	100

16151. Congenital debility, icterus, and sclerema . . .

R.G.
154.

XII.—OLD AGE.

Group	Total
1	100
2	100
3	100
4	100
5	100
6	100
7	100
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XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.

Group	Total
1	100
2	100
3	100
4	100
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167. Burns (conflagration excepted)
169. Accidental drowning
185. Fractures (cause not specified)
186. Other external violence

XIV.—ILL-DEFINED DISEASES.

Group	Total
1	100
2	100
3	100
4	100
5	100
6	100
7	100
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187. Ill-defined organic disease

STILL-BIRTHS.

Not included in totals

CAUSES OF DEATH IN THE TOWN OF CORNWALL, 1916.

OFFICIAL ENGLISH TRANSLATION.
DISEASES AND CAUSES OF DEATH.

Number of (1911).Grand Total

I.—GENERAL DISEASES.

Group	Total
1	100
2	100
3	100
4	100
5	100
6	100
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|----|--|-------|
| 1. | Typhoid fever | |
| 8. | Whooping cough | |
| 9. | Diphtheria and croup | |
| 4. | Tetanus | |
| 8. | Tuberculosis of the lungs | |
| 0. | Tuberculous meningitis | ..... |
| | Abdominal tuberculosis | ..... |
| 1. | Cancer and other malignant tumors of the | ..... |
| 9. | buccal cavity | ..... |
| 0. | Cancer and other malignant tumors of the | ..... |
| | stomach, liver | ..... |
| 1. | Cancer and other malignant tumors of the | ..... |
| | peritoneum, intestines, rectum | ..... |
| 2. | Cancer and other malignant tumors of the | ..... |
| | female genital organs | ..... |
| 3. | Cancer and other malignant tumors of the | ..... |
| | breast | ..... |
| 5. | Cancer and other malignant tumors of other | ..... |
| | organs and of organs not specified | ..... |
| 4. | Anæmia, chlorosis | ..... |
| 6. | Alcoholism (acute or chronic) | ..... |

III.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.

Group	Total
1	100
2	100
3	100
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60. Encephalitis
64. Cerebral hæmorrhage, apoplexy
66. Paralysis without specified cause
71. Convulsions of infants
74. Other diseases of the nervous system

III—DISEASES OF THE CIRCULATORY SYSTEM.

Group Total

- 79 Organic diseases of the heart

VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.

Group Total

120. Bright's disease

XI.—DISEASES OF EARLY INFANCY.

Group Total

151. Congenital debility, icterus, and sclerema

153. Lack of care

154. XII.—OLD AGE.

Group Total

XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.

Group Total

167. Burns (conflagration excepted)

169. Accidental drowning

170. Traumatism by firearms

175. Traumatism by other crushing.

(a) Railroad

(b) Street car

(c) Automobile

(d) Other crushing

182. Homicide by firearms

185. Fractures (cause not specified)

186. Other external violence

XIV.—ILL-DEFINED DISEASES.

Group Total

189. Cause of death not specified or ill-defined

CAUSES OF DEATH IN THE TOWN OF LINDSAY, 1916.

OFFICIAL ENGLISH TRANSLATION. DISEASES AND CAUSES OF DEATH.		Total.	Ages.																			Sex.		Nativity.			Social Con.		Months.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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			Under 1.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10-14.	15-19.	20-29.	30-39.	40-49.	50-59.	60-69.	70-79.	80 and over.	Not stated.	18	19	20	21	22	23	24	25	26	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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CAUSES OF DEATH IN THE TOWN OF MIDLAND, 1916.

OFFICIAL ENGLISH TRANSLATION. DISEASES AND CAUSES OF DEATH.		Number of Column.	Ages.																							Sex.		Nativity.			Social Con.		Months.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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Grand Total	82	23	1	1	1	1	4	7	8	8	3	11	10	5	14	3	36	46	36	8	69	13	45	37	45	26	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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Group Total	22	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

CAUSES OF DEATH IN THE TOWN OF OSHAWA, 1916.

OFFICIAL ENGLISH TRANSLATION.
DISEASES AND CAUSES OF DEATH.

[illegible]

IV.—DISEASES OF THE RESPIRATORY SYSTEM.																														
Group Total		14	3	3							1	1		1	3	1	1		4	10	4	6	8	5	2	3	1	1	2	
89. Acute bronchitis		2	1	1															2	2		2	1	2						
90. Chronic bronchitis		1																	1	3	1	3	1	1						
91. Broncho-pneumonia		3	1	2															2	3	2	1	6	2	1	1	1	1	2	
92. Pneumonia		7	1								1	1		1	3	1			5	5	2	1	1	2	1	1	1	1	2	
94. Pulmonary congestion, pulmonary apoplexy		1										1						1			1		1							
V.—DISEASES OF THE DIGESTIVE SYSTEM.																														
Group Total		15	7	7							1	1	2	1	1	1		7	12	3	9	6	2	2	1	1	1	1	1	
100. Diseases of the pharynx		1																1	1		1									
104. Diarrhoea and enteritis (under 2 years)		6	6															3	6	3	1	1						1	1	
109. Hernias, intestinal obstructions		2																1	2	1	1	1	1	1				1	1	
110. Diseases of the intestines		1	1																1	1		1		1						
115. Other diseases of the liver		2											1					1	1	1	2	2	1					1	1	
117. Simple peritonitis (non-puerperal)		3										1	1					1	1	2		3	1	1	1					
VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.																														
Group Total		2	1	1															2	2		1	1					1	1	1
119. Acute nephritis		1	1																1	1		1							1	
120. Bright's disease		1																	1	1			1						1	
VII.—THE PUERPERAL STATE.																														
Group Total		3									1	2							3				3			1	1			
134. Accidents of pregnancy		1																	1	1			1						1	
137. Puerperal septicæmia		2										1	1						2	2			2			1	1			
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.																														
Group Total		1																	1	1 <th></th> <th></th> <th>1<th></th><th></th><th></th><th></th><th><th>1<th></th></th></th></th>			1 <th></th> <th></th> <th></th> <th></th> <th><th>1<th></th></th></th>					<th>1<th></th></th>	1 <th></th>	
142. Gangrene		1																	1	1			1						1	
XI.—DISEASES OF EARLY INFANCY.																														
Group Total		10	10	10														5	10		10		10	1 <td>1</td> <td>2</td> <td>1</td> <td>2</td> <td>3</td> <td></td>	1	2	1	2	3	
151. Congenital debility, icterus, and sclerema		10	10															5	10		10		10	1	1	2	1	2	3	
XII.—OLD AGE.																														
Group Total		4																2	3	1		4					1	1	1	1

OWEN SOUND—Concluded.

Number of Column.																																	
II.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.																																	
Group Total																																	
61.	Simple meningitis																																
63.	Other diseases of the spinal cord																																
64.	Cerebral hæmorrhage, apoplexy																																
65.	Softening of the brain																																
66.	Paralysis without specified cause																																
70.	Convulsions (non-puerperal)																																
71.	Convulsions of infants																																
74.	Other diseases of the nervous system																																
76.	Diseases of the ears																																
III.—DISEASES OF THE CIRCULATORY SYSTEM.																																	
Group Total																																	
79.	Organic diseases of the heart																																
81.	Diseases of the arteries, aneurysm, etc.																																
82.	Embolism and thrombosis																																
IV.—DISEASES OF THE RESPIRATORY SYSTEM.																																	
Group Total																																	
89.	Acute bronchitis																																
90.	Chronic bronchitis																																
91.	Broncho-pneumonia																																
92.	Pneumonia																																
96.	Asthma																																
98.	Other diseases of the respiratory system (tuberculosis excepted)																																
V.—DISEASES OF THE DIGESTIVE SYSTEM.																																	
Group Total																																	
102.	Ulcer of the stomach																																
105.	Diarrhea and enteritis (2 years and over)																																
108.	Appendicitis and typhilitis																																
109.	Hernias, intestinal obstructions																																
110.	Diseases of the intestines																																
115.	Other diseases of the liver																																
VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA.																																	
Group Total																																	
120.	Bright's disease																																
124.	Diseases of the bladder																																

VII.—THE PUERPERAL STATE.

[illegible]

PARRY SOUND—Concluded.

Number of Column.																																					
XI.—DISEASES OF EARLY INFANCY.																																					
14	14																																				
Group Total																																					
151.	Congenital debility, icterus, and sclerema....																																				
154.	XII.—OLD AGE.																																				
4																																					
Group Total																																					
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																					
11																																					
Group Total																																					
6	167. Burns (conflagration excepted)																																				
1	168. Absorption of deleterious gases (conflagration excepted)																																				
3	169. Accidental drowning																																				
175. Traumatism by other crushing.																																					
1	(a) Railroad																																				
	(b) Street car																																				
	(c) Automobile																																				
	(d) Other crushing																																				
XIV.—ILL-DEFINED DISEASES.																																					
1																																					
Group Total																																					
1	189. Cause of death not specified or ill-defined																																				
STILL-BIRTHS.																																					
11	11																																				
Group Total																																					

V—DISEASES OF THE DIGESTIVE SYSTEM.

[illegible]

VI.—NON-VENEREAL DISEASES OF THE GENITO- URINARY SYSTEM AND ADNEXA.

[illegible]

XI.—DISEASES OF EARLY INFANCY.

[illegible]

154. XII.—OLD AGE.

[illegible]

XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.

[illegible]

XIV.—ILL-DEFINED DISEASES.

[illegible]

SUDBURY—Concluded.

Number of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
X.—CONGENITAL MALFORMATIONS.																																									
Group Total		4	4																3	1	4	4			4			2	1												
150. Congenital malformations (still-births not included)		4	4																3	1	4	4			4			2	1												
XI.—DISEASES OF EARLY INFANCY.																																									
Group Total		30	30																16	14	30	30			30			1	1												
151. Congenital debility, icterus, and sclerema		30	30																16	14	30	30			30			1	1												
154. XII.—OLD AGE.																																									
Group Total		5																	3	2	4	4			1			1	4												
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																									
Group Total		31	3																28	3	20	20			16			2	2												
157. Suicide by hanging or strangulation		1																	1						1																
165. Other acute poisonings		1	1																1						1																
167. Burns (conflagration excepted)		3																	2	1	1	1			1			1													
169. Accidental drowning		2																	2		2	2			1			1													
170. Traumatism by firearms		2																	2		1	1			2																
172. Traumatism by fall		2	1																2		2	2			2																
173. Traumatism in mines and quarries		1																	1		1	1			1																
175. Traumatism by other crushing.																																									
(a) Railroad		5																	5		1	1			2			3													
(b) Street car																																									
(c) Automobile																																									
(d) Other crushing		2																	2		2	2						2													
181. Electricity (lightning excepted)		1																	1		1	1			1			1													
184. Homicide by other means		1																	1		1	1			1			1													
185. Fractures (cause not specified)		7																	7		4	3			3			4													
186. Other external violence		3	1																1	2	1	1			1			2													
XIV.—ILL-DEFINED DISEASES.																																									
Group Total		1																	1		1	1						1													
188. Sudden death		1																	1		1	1																			
STILL-BIRTHS.																																									
Not included in totals		27	27																15	12	27	27			27				4	4	2	2	1	2	2	2	2	1	2	3	

TRENTON—Concluded.

[illegible]

Forty-Fifth Annual Report
OF THE
Provincial Board of Health
OF
Ontario, Canada
FOR THE YEAR
1916

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO



TORONTO :

Printed and Published by A. T. WILGRESS, Printer to the King's Most Excellent Majesty
1917

Printed by
WILLIAM BRIGGS
Corner Queen and John Streets
TORONTO

TO HIS HONOUR SIR JOHN STRATHEARN HENDRIE, K.C.M.G., C.R.V.O., etc.,
etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR.—I herewith beg to present for your consideration the Thirty-fifth Annual Report of the Provincial Board of Health for the year 1916.

Respectfully submitted,

WM. DAVID MCPHERSON,

Provincial Secretary.

TO THE HONOURABLE W. D. MCPHERSON, K.C., M.P.P.,

Provincial Secretary of Ontario.

SIR,—I have the honour to submit for your approval the Thirty-fifth Annual Report of the Provincial Board of Health, made in conformity with and under the provisions of the Public Health Act, for the year 1916.

I have the honour to be, Sir,

Your obedient servant,

JOHN W. S. McCULLOUGH,

Chief Officer of Health.

PROVINCIAL BOARD OF HEALTH OF ONTARIO

1916

The Board:

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THOMAS E. KAISER, M.D.Oshawa.
WILLIAM H. HOWEY, M.D.Sudbury.
A. A. WEAGANT, M.D.Ottawa.
JAMES ROBERTS, M.D., M.O.H.Hamilton.

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GEO. E. YOUNG, ALEX. R. WHITE, Sanitary Inspectors.

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H. M. LANCASTER, B.A.Sc., Provincial Chemist, Professor of Chemistry, Dental College, University of Toronto.
R. W. NAYLOR, M.B., Assistant Bacteriologist.
A. R. BONHAM, B.A.Sc., Assistant Chemist.
W. T. CONNELL, M.D., Branch Laboratory, Kingston.
W. H. HILL, M.D., D.P.H. (Tor.), Branch Laboratory, London.

Engineering Service:

F. A. DALLYN, C.E. (Tor.), Provincial Sanitary Engineer.
A. V. DELAPORTE, B.A.Sc., Chemist in Charge of Experimental Station.

Child Welfare Bureau:

MISS MARY POWER, B.A.

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District.

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No. 3.—DANIEL A. McCLENAHAN, M.D., Hamilton.
No. 4.—GEORGE CLINTON, M.D., Belleville.
No. 5.—PAUL J. MOLONEY, M.D., Cornwall.
No. 6.—W. EGERTON GEORGE, M.D., North Bay.
No. 7.—ROBERT E. WODEHOUSE, M.D., Fort William.

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ANNUAL REPORT

OF THE

Provincial Board of Health for the Province of Ontario

For the Year Ending 31st December, 1916

RÉSUMÉ OF TRANSACTIONS OF THE BOARD BY THE CHIEF OFFICER

This is the Thirty-fifth Annual Report of the Provincial Board of Health for the year ending on the 31st day of December, 1916.

With the exception of Dr. H. R. Casgrain and Dr. James Roberts, all the members of the Board attended the regular meetings. Dr. (Lieut.-Colonel) Casgrain was invalided from Lemnos during the year and Dr. (Capt.) Roberts returned from the same place on sick leave during the spring. He attended the later meetings of the Board.

No new regulations were promulgated during the year.

FREE DISTRIBUTION OF BIOLOGICAL PRODUCTS.

Perhaps the most distinct advance made in public health during the year was the announcement made early in the year, of the Government's intention to furnish to the public, free of charge, diphtheria antitoxin, tetanus antitoxin, smallpox vaccine, anti-meningitis serum and Pasteur preventive treatment for rabies, in addition to typhoid vaccine which for some years had been supplied gratuitously. It will be remembered that these products had since 1914 been supplied to the public at prices much below those quoted by commercial firms. This arrangement had given universal satisfaction. It was felt, however, that a further advance should be made. The plan decided upon was that the Board should continue its arrangement with the Antitoxin Laboratory of the University of Toronto, namely, to purchase these products and supply them gratuitously to the public. The financial agreement is very satisfactory. The Board receives a requisition from Medical Officers of Health, hospitals or Boards of Health for these products, the requisitions are entered in books kept for the purpose and forwarded promptly to the Antitoxin Laboratory, which at once sends them to the parties making requisition. The bills are met by the Board monthly. The service is prompt and there is ample evidence of the satisfaction given to the public.

ANTITYPHOID AND ANTIPARATYPHOID VACCINE.

Since about the first of June paratyphoid A and B have been added to the antityphoid vaccine prepared by the Board. Large supplies have continued to be supplied to the Department of Militia and Defence. The low incidence of typhoid and paratyphoid among Canadian troops both here and at the front is the best argument in favour of this protective measure. There is a gradually increasing demand for the vaccine from practitioners of medicine throughout the Province.

The activities of the Provincial Board of Health are already bearing fruit as evidenced by the distinct lowering of the death rate from diphtheria. This is due to the fact it is now possible in Ontario, to obtain antitoxin readily and at no ex-

pense. Many lives have already been saved, but even more will be accomplished when the war is over and an intensive campaign can be undertaken to save the lives of children who die of diphtheria because antitoxin is not used early enough and in sufficient quantity.

It may not be amiss to refer to the fact that the success of the scheme is due in a large measure to the princely gift made to the University of Toronto by Colonel Albert E. Gooderham. This consisted of the donation by that gentleman of a farm of some fifty acres and the necessary buildings and equipment for the purpose of a biological laboratory. These premises, to be known as the Connaught Laboratories, are situated about twelve miles north of the city, adjacent to Dufferin Street. The property has a delightful situation on the banks of the west branch of the Don River. The buildings are large, modern and of the most substantial character as the included cuts show.

The Board desires to express its profound appreciation of the interest in this important project manifested by the Director of the Antitoxin Laboratory, Dr. J. G. Fitzgerald, and the great assistance it has had at his hands in bringing the scheme to a successful issue. It cannot prove otherwise than of great value to the people of Ontario in the prevention of disease and in the promotion of the public health.

The Director of the Laboratory, Dr. John A. Amyot, has been serving as Major (more recently as Lieut.-Colonel) with the C.A.M.C. in France since the spring of 1915. His services here have been much missed, but reports from the front indicate that they are of greater value in the promotion of sanitary measures among Canadian soldiers. In his absence the direction of the laboratory has devolved upon H. M. Lancaster, B.A.Sc., Provincial Chemist, and the assistant bacteriologist, Dr. F. C. Schofield. Unfortunately in the latter part of the year Dr. Schofield decided to accept the post of bacteriologist with the Severance Union Medical College, of Seoul, Korea.

Dr. Schofield, during his association with the Board, had given evidence of exceptional ability. His energy and devotion to duty were remarkable. It was with the deepest regret that the members of the Board received his resignation. If, as it is sincerely hoped, his health is maintained in the foreign country where he has taken up his abode, there can scarcely be imagined the scientific attainments his genius may reach. Dr. Schofield's place has been filled by Dr. Naylor, a graduate of the University of Toronto.

LEGISLATION.

The following amendments to the Public Health Act were passed during the 1916 Session of the Legislative Assembly:

Rev. Stat.
c. 218, s. 8,
amended.

Section 8 of *The Public Health Act* is amended by inserting therein the following clauses:—

Regulations
as to
plumbing.

(dd) The construction, repair, renewal, alteration and inspection of plumbing, the material to be used in the construction of, and the location of drains, pipes, traps, and other works and appliances forming part of or connected with the plumbing in any building or upon any property or in any highway, street, lane or public place, and in any structure or place, whether permanent or temporary, constructed or used thereon or therein.



The Connaught Laboratories, University of Toronto.



View of Laboratories.



An interior view of the Laboratory.



An operating room.

- (ddd) The location, construction, repair, renewal, alteration, and inspection of sewers, drain pipes, manholes, gulley traps, flush tanks and other works in or upon public, municipal or private property forming part of or connected with any municipal sewerage system. Sewerage system.

Section 13 of *The Public Health Act* is amended by adding thereto the following subsection:— Rev. Stat. c. 218, s. 13, amended.

- (10) The Provincial Board, every district officer of health and inspector, and every medical officer of health and sanitary inspector shall have authority to enforce the By-law set out in Schedule B, or any amendment thereof approved by the Provincial Board, and any by-law respecting the milk supply of, and any other by-law respecting sanitary matters in a municipality, and for this purpose may institute proceedings for the prosecution of offenders against any of the said by-laws. Enforcement of sanitary by-laws.

Section 37 of *The Public Health Act* is amended by adding thereto the following subsection:— Rev. Stat. c. 218, s. 37, amended.

- (2) A medical officer of health who refuses or neglects to carry out the provisions of this Act or the Regulations, or any special order of the Provincial Board, or any by-law of the municipality relating to sanitary matters, may be dismissed from office by the Provincial Board or by the municipal corporation on the recommendation of the Board. Dismissal of M.O.H. for neglect of duty.

Section 53 of *The Public Health Act* is amended by adding thereto the following subsection:— Rev. Stat. c. 218, s. 53, amended.

- (3) Every such notice filed with the medical officer of health shall be transmitted forthwith by him to the secretary of the local board of health, and shall be included in the weekly report required to be sent to the Provincial Board under section 24.

Sections 75 and 76 of *The Public Health Act* are repealed and the following inserted in lieu thereof:— Rev. Stat. c. 218, sections 75 and 76, repealed.

75. The Medical Officer of Health of any municipality, or any inspector or other person in the employ of the Local Board acting under his instructions, or any member of a Local Board may enter, inspect and examine at any time of the day or night, as often as he thinks necessary, any premises within the municipality for the purpose of carrying out the provisions of this Act, and may take such action as he deems necessary for carrying out the said provisions, and any person in charge of such premises for the time being shall render such aid to the Medical Officer of Health or other person as may be necessary to make such inspection or examination. Inspection of municipality.

Duty of
medical
health
officer.

76.—(1) Every Medical Officer of Health shall see that the municipality or location for which he is appointed is regularly inspected in order to prevent nuisances or to abate any existing nuisance.

Examina-
tion of
premises
and order
for cleans-
ing.

(2) If upon such examination he finds any premises in a filthy or unclean state, or that any matter or thing is there which, in his opinion, may endanger the public health, he may order the owner or occupant of the premises to cleanse the same, and to remove or destroy what is so found therein.

Rev. Stat.
c. 218, s. 103,
subs. 1,
amended.

(1) Subsection 1 of section 103 of *The Public Health Act* is amended by striking out the word "four" in the third line and inserting in lieu thereof the word "two."

Rev. Stat.
c. 218, s. 103,
subs. 2,
amended.

(2) Subsection 2 of section 103 of *The Public Health Act* is amended by striking out the word "four" in the second line and inserting in lieu thereof the word "two."

Rev. Stat.
c. 218, s. 110,
amended.

Section 110 of *The Public Health Act* is amended by adding the following subsection:—

Penalty for
selling
biological
products
supplied
by Board.

(4) Every person who sells either publicly or privately any of the biological products supplied to the public free of charge by the Board shall incur a penalty of \$100, and in default of payment thereof shall be liable to imprisonment for a period of three months.

Rev. Stat.
c. 218, s. 115
amended.

Section 115 of *The Public Health Act* is amended by adding thereto the following subsection:—

Effect of
by-law,
sched. "B."

(3) The By-law set out in Schedule B and any amendment thereof approved by the Provincial Board shall have the same force and authority as a regulation made under this Act by the Provincial Board.

Rev. Stat.
c. 218, s. 125,
subs. 2,
amended.

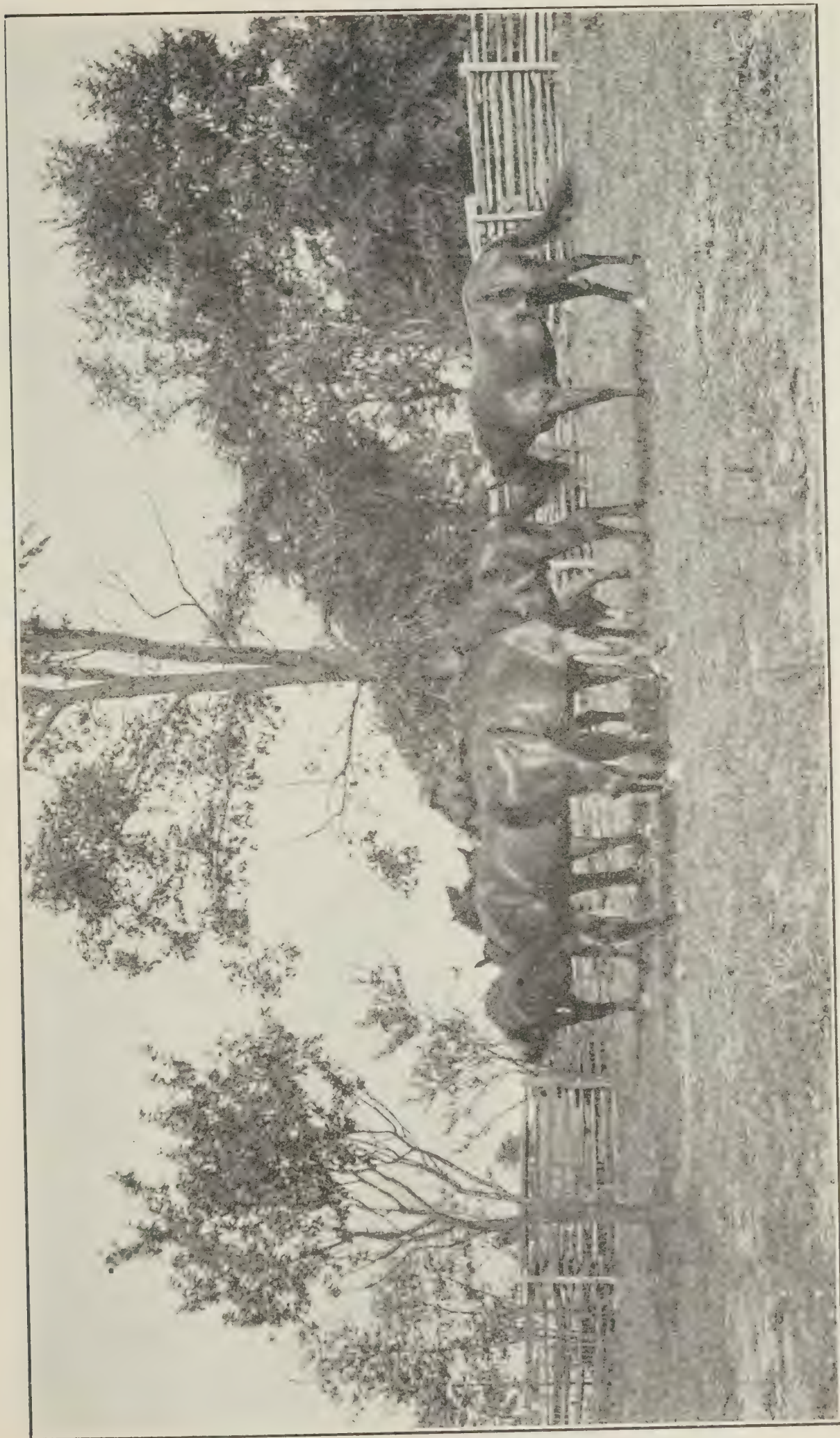
Subsection 2 of section 125 of *The Public Health Act* is amended by inserting after the word "officer" in the first line the words "or officers."

WATER SUPPLIES AND SEWERAGE.

A full report in reference to the Board's supervision of waterworks and sewerage construction is given elsewhere in this volume by the Provincial Sanitary Engineer. It is evident that the public is appreciating more and more the advantages of pure water supplies, and the necessity of a more careful attention to a proper disposal of sewage. Many necessary works have been, to our regret, held up because of the stringency in the labour market, and the increased cost of material, due to the war.

THE LABORATORIES.

Medical men and the public generally continue to make increasing use of the extensive facilities of the Laboratories of the Board at Kingston, London and



A group of horses, Connaught Laboratories.



A group of horses, Connaught Laboratory.



Injecting Tetanus Toxin into one of the horses.

Toronto. The reports of the officers in charge of these laboratories are included herein. It is apparent that the service afforded is considered of very great value. The enactment of prohibition in September of this year has added greatly to the work of the Toronto laboratory because of the enormous increase of samples of liquor seized by the License Department, all of which are examined at this Laboratory.

THE EXPERIMENTAL PLANT.

This plant continues to carry on research work in relation to sewage and water. A full report is appended.

ANNUAL CONFERENCE OF MEDICAL OFFICERS OF HEALTH.

This Association continues to attract large and increasing numbers of the Medical Officers of Health in the Province. It is noticeable that the most up-to-date Medical Officers are those most constant in their attendance. In the absence of the President, Dr. A. W. McPherson, of Peterborough, who is on active service, the chair, at the recent meeting held in Toronto, was taken by Dr. Alex. J. Macaulay, M.O.H. of Brockville, who was elected to the presidency for 1917. Dr. T. A. Vardon, the veteran M.O.H. of Galt, always a notable figure at these and other medical meetings, was elected Vice-President. Unfortunately Dr. Vardon has since passed to the beyond. His ready tongue and genial presence will be missed at our future meetings.

Two interesting features of this meeting were the addresses given by Mr. T. Chalkley Hatton, C.E., Engineer to the Milwaukee Sewerage Commission on "The Treatment of Sewage by Activated Sludge," and by Dr. Wm. H. Park, of the New York Department of Health on "Diphtheria."

The list of papers was extensive and much above the average in value.

THE DISTRICT OFFICERS OF HEALTH.

Additional work has fallen to the lot of the officers in districts two and six because of the absence, on active service overseas, of the officers of districts one and seven, whose work has in their absence been carried on by their confreres. In November the serious illness of Mr. Geo. E. Young, Sanitary Inspector in Northern Ontario, necessitated the appointment of Mr. Alex. R. White, whose good record as Sanitary Inspector of North Bay indicates that he will render valuable service to the Board.

EPIDEMIOLOGICAL SERVICE.

The assistance given to municipalities by the district officers in the investigation and curbing of outbreaks of disease has been supplemented by the establishment of an expert epidemiological service, which will be at the disposal of Boards of Health and medical practitioners. In this way it is hoped to render effective aid, the more especially in relation to typhoid fever, infantile paralysis and cerebro-spinal fever.

CHILD WELFARE BUREAU.

The preventable deaths of infants is a subject demanding more attention on the part of Boards of Health than it has, in this Province at least, heretofore received.

The annual deaths in the Province of children under one year is now nearly seven thousand, which is equivalent to an infant mortality rate of 102—a rate capable of betterment in the light of present day knowledge.

The results of attention to this phase of public health in other countries such as Norway, Sweden, New Zealand and Australia indicate the value of life-saving measures in infancy. *No other variety of public health work is of greater value.* Prevention of the deaths of infants and young children *can* be accomplished.

In respect to this important subject, it is interesting to learn from the Milroy Lectures 1916 (S. G. Moore, M.D., D.P.H. Huddersfield), published in the London *Lancet* of April 22, 29, and May 6, 1916, that in the Village of Villiers-le-Duc, France, the infant mortality figure for ten years has been *zero*. I should like to include, because of their practical value, the entire series of lectures given by Dr. Moore, but as space will not permit the reader is referred to the journal mentioned for the information. In Villiers-le-Duc the astonishing fact of the entire absence of deaths among infants for the last ten years is accounted for by the enforcement by the Mayor of the following regulations:

REGULATIONS.

The Mayor of Villiers-le-Duc, considering that the municipal authorities have the duty of endeavouring to stop the depopulation of the country by taking the measures necessary to prevent birth mortality and any child being stillborn, and to do away with infantile mortality, the municipal council orders as follows:—

Article I.—Every woman with child, whether married or not, having her home in the village, and not in possession of sufficient means to allow her to take upon herself the expense of the measures necessary to secure, as far as possible, not only her own life, but also that of the child about to be born, shall have the right to require the help of the village authority.

Article II.—In order to take advantage of this favour she must declare her condition at the office of the Mayor, before the seventh month, and she shall at the same time indicate by what midwife she wishes to be attended. The midwife named shall be requested by the official head of the village to visit the woman with child in order to ascertain for herself that there is present neither albuminuria nor dystocia either of the child or of the mother, nor dangerous presentation. For this visit there shall be allowed to the midwife a sum of (5 francs) 4s. 2d. out of the fund opened in the village for free medical aid, and without any share of liability on the State or on the department.

Article III.—In case the midwife, after this examination, shall consider that it is necessary to call in a medical man, she must at once notify the municipal authority without giving the reason for the notice. The authority shall then request a medical man, at the choice of the woman with child, to take the measures necessary to bring about the confinement successfully. The fees of the medical man shall be secured on the credit of the free medical aid fund without any liability on the State or department.

Article IV.—Every woman who is assisted by the Commune at her confinement shall receive a grant of 10d. per day during six days (not counting the day of her confinement) if she remains in bed. This grant shall be paid to her at the end of six days. If the woman gets up before the time fixed the grant shall be refused. The cost of this shall be defrayed from the free medical aid fund without liability on the State or the department.

Article V.—Every woman who takes in a child to nurse, if she does not feed it at the breast, or if she feeds it partly at the breast and partly otherwise, shall be bound to provide herself with an apparatus to sterilize the milk, and shall follow out, for the feeding of the child, the written instructions which will be supplied to her by the municipality. She shall on every occasion, when required by the municipality or by the visiting doctors, produce the sterilizing apparatus, the feeding bottles, full or empty, the teats, and other accessories, in such a way that it will be possible to ascertain that they are in good condition.

Article VI.—All the infants placed out to nurse shall be weighed every fortnight on the communal baby-weighing machine either at the office of the commune, if time permit, or at the home of the child. The increase of weight shall be noted on a slip kept separately for each child, and preserved at the office of the Commune.

Article VII.—Every nurse-child brought up at the breast or on the bottle who may be attacked by any illness, especially by diarrhoea, vomiting, or respiratory troubles, must be notified to the municipality with a maximum delay of not more than 24 hours from the first appearance of the illness.

Article VIII.—In case nurses who have charge of the infants do not conform to the regulations in Articles, 5, 6, and 7 above given, the certificate notifying their qualifications may be withdrawn from them eight days after the notification has been received without effect.

Article IX.—An apparatus for sterilizing milk and exchangeable parts of the apparatus shall be placed at the office of the authority for disposal to the nurses, who may purchase them at a reduced price. The mothers who nurse their own children, and who are known to be in a state of poverty, shall be able to obtain on loan, without charge, a sterilizing apparatus which they shall return to the office after the weaning of the child.

Article X.—Every nurse bringing up her own child, or a child entrusted to her, whether at the breast or by bottle, who shall produce the child in a good state of health at the age of one year, shall have the right to a grant of 2s. per month dating from the time when the child was begun to be nursed by her, up to the time when the child shall have reached the age of one year.

Ordered at Villiers-le-Duc.

THE MAYOR DE VILLIERS.

While the number of cases in Villiers-de-Duc is too small upon which to accurately base inferences yet the information is most interesting.

It will be seen, as the essayist points out, that the essential features of the foregoing regulations are:

(1) They are orders to the people to do certain things and not merely recommendations or advice.

(2) Every mother with child has the right to adequate assistance in child-bearing.

(3) She is required to notify pregnancy.

(4) The midwives (they have midwives in France) are required to ascertain that the pregnancy is normal, and if not, so to notify the fact to the authority. For this service the midwife is paid out of the public funds.

(5) The authority pays whatever doctor the mother chooses.

(6) The authority has continuous supervision of and provision for the infant.

(7) The Regulations are complete; they deal with all mothers.

That the orders were obeyed are vouched for by the results.

While such regulations are at present scarcely applicable to this country they serve as a guide to indicate how good results may be obtained.

The regulations point out that the mother requires supervision by skilled advice before the birth of her baby; that she should have the services of a competent physician and careful nursing at her confinement, the expenses of which should, if necessary, be met by the State, and that the infant's life should be continuously supervised and provision made for its proper care.

Education of prospective mothers (and fathers too) is necessary in the prevention of infant mortality.

By the establishment of a Bureau of Child Welfare the Board has made a start in the right direction. The duties of this Bureau will be to conduct investigations in various communities in respect to infant mortality, to provide literature and advice to mothers in the care of their babies, and in a general way to be a source of help and comfort to anyone who may be in need of assistance in this important variety of life-saving.

Miss Mary Power, B.A., is in charge of this Branch.

INFANTILE PARALYSIS.

The extensive outbreak of acute Anterior Poliomyelitis in New York City occasioned some alarm in the Province. This with the smaller outbreak in Montreal, Quebec, was the occasion of adopting quarantine measures against the United States and the eastern provinces. We had a number of cases, happily not of the severe type, in Windsor and Ford City, but there was not at any time any real feeling of alarm in Ontario. A demand for information upon this subject, from both medical men and the general public, induced the Board to prepare a leaflet embodying some simple regulations and general advice. This is sent to all medical practitioners and to other persons upon request.

DEATHS IN ONTARIO FROM TUBERCULOSIS BY AGES, 1906-1916.

Year.	Total.	Ratio per 100,000	Under 5 years.					5-9	10-14	15-19	20-29	30-39	40-49	50-59	60-69	70-79	80 & over.	Not stated.	Total deaths from all causes.
			0-1	1	2	3	4												
	23,974		594	368	225	140	136	467	578	1,881	6,776	4,904	3,058	2,204	1,526	680	129	308	324,486
1907	2,530	113	74	41	27	20	15	44	62	206	745	499	311	227	173	64	9	13	31,756
1908	2,511	110	68	46	20	13	13	43	67	216	764	479	315	217	136	70	14	30	30,947
1909	2,380	106	47	27	25	9	15	54	54	179	687	487	290	222	163	66	15	40	30,792
1910	2,291	102	38	35	19	15	6	36	55	184	652	463	293	222	160	71	18	24	31,332
1911	2,353	92	63	30	15	10	18	48	64	181	618	476	325	218	156	85	12	34	31,878
1912	2,250	87	53	30	19	9	15	46	42	154	631	500	304	200	134	64	7	42	32,150
1913	2,294	85	52	36	20	10	18	32	41	188	632	479	313	204	156	56	10	47	34,317
1914	2,340	85	54	41	20	16	11	56	58	181	688	469	307	214	116	63	12	34	32,440
1915	2,466	89	79	39	25	19	16	55	74	168	676	515	273	242	176	73	15	20	33,294
1916	2,559	91	66	43	35	19	9	53	61	224	683	536	327	238	156	68	17	24	35,580

This Table Compiled by the Registrar General's Department.

CASES AND DEATHS FROM COMMUNICABLE DISEASES, REPORTED WEEKLY BY LOCAL BOARDS OF HEALTH FOR THE YEAR 1916.

Months.	Scarlet Fever.		Diphtheria.		Measles.		Whooping Cough.		Typhoid.		Tuberculosis.		Infantile Paralysis.		Cerebro-spinal Meningitis.	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
January	21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
February	34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
March	32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
April	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
May	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
June	44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
July	9	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
August	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
September .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
October	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
November	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
December	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals 1916.....	174	3	3,212	284	21,977	227	2,205	97	1,225	158	1,813	984	190	27	195	129
.. 1915.....	626	2	2,719	169	9,684	107	882	51	920	96	1,356	774	13	4	139	105
.. 1914.....	511	2	2,772	213	4,884	60	798	56	1,060	125	1,335	776	29	5	68	55
.. 1913.....	774	2	2,194	233	7,895	134	484	84	1,519	213	1,576	1,040	35	20	61	48
.. 1912.....	535	3	2,540	238	2,634	58	414	142	2,569	305	1,525	860	49	19	59	58

Only 40% of the deaths from Tuberculosis are reported weekly by the Local Boards of Health.

BIOLOGICAL PRODUCTS DISTRIBUTED FREE

BY THE PROVINCIAL BOARD OF HEALTH.

February 1st to October 31st, 1916.

Number of separate Municipalities receiving supplies, 539.

Smallpox Vaccine..... 26,985 points.
Diphtheria Antitoxin.....120,224,000 units.
Anti-Meningitis Serum1,310 x 20 c.c.
Tetanus Antitoxin..... 2,418,000 units.
Anti-Typhoid and Paratyphoid Vaccine.....20,006 doses (civil).
.....467,541 " (Militia).

	Smallpox.	Diphtheria Antitoxin.	Diphtheria Antitoxin.	Anti- Meningitis Serum.	Intra- Spinal.
	Points.	Units.	Syringes.	Vials of 20 c.c.	Outfits.
February	5,910	41,169,000	3,550	476	208
March	5,225	16,367,000	1,224	180	44
April	3,405	8,154,000	329	212	50
May	3,485	12,275,000	384	117	28
June	2,795	5,928,000	479	87	10
July	1,830	11,029,000	325	98	19
August	1,430	8,211,000	663	94	17
September	1,625	6,803,000	792	31	11
October	1,280	10,288,000	914	15	5
	26,985	120,224,000	8,660	1,310	392

	Tetanus Antitoxin.	Tetanus Antitoxin.	Pasteur Preventive Treatment for Rabies.	Revenue for Special Containers.
	Units.	Syringes.		\$ c.
February	991,500	208	.....	845 20
March	141,000	54	2	275 40
April	174,000	23	.....	92 90
May	243,000	41	8	97 60
June	93,000	16	6	103 50
July	127,500	25	13	78 55
August	273,000	62	5	152 65
September	177,000	19	13	167 15
October	198,000	29	1	190 85
	2,418,000	477	48	\$2,003 80

COST;

	\$ c.
Smallpox Vaccine	1,079 40
Diphtheria Antitoxin	19,765 60
Anti-Meningitis Serum	1,605 40
Tetanus Antitoxin	820 80
Pasteur Preventive Treatment for Rabies.....	720 00
	\$23,991 20
Revenue	2,003 80
Net cost	\$21,987 40

THE DISTRICT OFFICERS OF HEALTH PROVINCE OF ONTARIO

DISTRICT NO. 1.

Comprising the Counties of Lambton, Middlesex, Oxford, Elgin, Kent, Essex.
District taken over temporarily by Dr. McNally in the absence on active service of
Dr. (Major) D. B. Bentley.

DISTRICT NO. 2.

Comprising the Counties of Grey, Bruce, Huron, Perth, Waterloo, Wellington
and Dufferin.

THOMAS J. McNALLY, M.D.

District Officer of Health, Guelph, Ont.

I have the honour to herewith submit the Annual Report of Districts No. 1 and 2, comprising thirteen counties, for the year ending December 31st, 1916.

During the year the efforts of your District Officer have been directed especially towards an oversight of the water supplies of the larger towns and cities of the two Districts, and control of the communicable diseases.

Systematic regular visits to rural municipalities have been out of the question owing to the large area under supervision, but all calls for assistance or correction of insanitary conditions have been as promptly attended to as possible.

The frequent communications received is an indication of awakened public interest in conditions pertaining to public health through the Publicity Campaign carried on by the Department in recent years.

During the year the following cities and towns were visited and the condition of the water supply carefully gone into as well as the general sanitary conditions, viz.: Owen Sound, Guelph, Kincardine, Ingersoll, Chatham, Sarnia, Port Elgin, Stratford, Goderich, Galt, Tillsonburg, Woodstock and Windsor.

To several of these repeated visits were made and with the co-operation of Local and Provincial Boards of Health we believe serious outbreaks of disease prevented.

Three municipalities during the year have instituted control of their milk supply and two have appointed school nurses who are doing excellent work.

Fifteen municipalities, viz.: Kincardine, Forest, Clinton, London Tp., Arthur Vge., St. Mary's, Mersea Tp., Paisley, Mitchell, Port Elgin, Guelph, Kingsville, Mount Forest, Walkerton, Orangeville, Galt, and Drumbo were visited in connection with sewers and insanitary drains; in ten of these the conditions complained of have been corrected and in the remainder improvements have been made though not completed.

It is pleasing to note the improvements made in slaughter-houses and the interest manifested by the local authorities in seeing that these places are built and

maintained according to the Regulations of the Provincial Board, though I regret to say there are some municipalities not yet awake to their duty in this field.

Considerable improvement has also been manifested in the sanitary condition and surroundings of the public schools, especially in the rural districts, since the Local Medical Officers of Health have been required to visit these institutions at least once a year, but we are sorry to note that there are a number of municipalities in which there has not been much accomplished in this matter.

It is in our opinion one of the most important duties of Rural Medical Officers, and it is respectfully suggested that each officer be required to give a personal report on each school and its sanitary conveniences, well and surroundings in his municipality each year to your Board.

COMMUNICABLE DISEASES.

Smallpox.

During the year this disease has made its appearance in several municipalities, but has not in any case assumed the proportions of an epidemic, though in five townships and two cities it has required our personal supervision.

Scarlet Fever.

Has appeared in very few municipalities and has in every case been confined to a few controlled cases of mild type.

Diphtheria.

This disease is now under very good control owing to the wise provision of free antitoxin by the Provincial Board of Health, though occasionally appearing in severe form and thus claiming its victims through lack of its being brought under early medical observation and treatment.

Measles.

This year has been marked by very wide-spread epidemics of measles, there having been in the two Districts twenty-nine municipalities asking for and receiving assistance and supervision, either by correspondence or personal visits, to assist the Local Boards in controlling this disease. It is still our most difficult disease to control or prevent owing to its period of infectivity previous to a possible definite diagnosis and the apparent indifference of the public and we regret to say of some medical men in reporting early cases. The only apparent improvement in our methods of action for prevention and control would seem to be a rigid quarantining of all non-immune contacts for the period of incubation. We are pleased to note the shortening of the period of quarantine for this disease to two weeks, as this time appears to give the public ample protection and should materially assist in the better notification of the mild cases and observance of the quarantine regulation.

Typhoid Fever.

There was one outbreak of this disease due apparently to the milk supply and in other places isolated cases with about the usual percentage of fatalities, but the year passed without any serious epidemic.

Mumps and Whooping-Cough.

A few localities have suffered from the above disease, but in only two instances was advice or assistance requested. In case of the latter disease it would appear that a strict quarantine of those affected and non-immune contacts should be required for the period of infection and incubation respectively. It would appear that the period of isolation now required is excessive in view of recent observations by those apparently qualified to judge.

Tuberculosis: (Open Cases.)

In this disease lies the future great work of the epidemiologist if we recognize in a practical way the communicable nature of the disease as we should.

We fear its common occurrence, its insidious and gradual onset has, in a large measure, dimmed our proper appreciation of responsibilities and opportunities for effort in this field.

While some advance has been made in this Province in the care of those suffering from the disease and the consequent reduction of the number of its victims, there has not been that effort made by legislation to control, in an adequate manner, the spread of this horrible disease that its prevalence demands.

Its common occurrence and the magnitude of the problem of its control seems apparently so far to be greater than the capacity of our people to understand or the courage and initiative of our legislators to grapple with.

Were as many deaths as much distress, poverty and loss due to any other disease it seems to me proper and adequate control would not only be demanded by our people, but provided by those with the authority to legislate. It is quite true that the outlay would be great, but the results would be infinitely greater.

Rabies.

Two municipalities sought and received assistance and advice in controlling this disease among animals with the result that the disease was apparently stamped out.

Poliomyelitis.

One municipality sought and obtained advice and assistance in controlling infantile paralysis.

Cerebro and Spinal Meningitis.

In only one municipality was advice requested for this disease.

CORRESPONDENCE.

Without going into details or names of municipalities concerned we may briefly cover the subject in this report by remarking that it involved about every conceivable subject and condition pertaining to sanitation and public health, and was of considerable volume requiring both time and effort to handle with satisfaction to our correspondents.

DISTRICT NO. 3.

Comprising Norfolk, Haldimand, Welland, Lincoln, Wentworth, Brant, Halton, Peel, York.

D. A. McCLENAHAN, M.D.

District Officer of Health, Hamilton.

The year 1916 was largely taken up with the continuance of the educational aspect of public health work. Lectures were given in connection with the Public Health Exhibit provided by the Board, as well as addresses to Municipal Councils, Boards of Health, Boards of Trade and various institutes throughout the District for the purpose of furthering the work.

In addition, I visited a large number of the municipalities, amongst others being Dunnville, Hagersville, Port Credit, Milton, Simcoe, Port Dover, Brampton, Fort Erie, Niagara Falls. Upon receipt of complaints as to alleged nuisances in any of the several municipalities in District No. 3 they were always promptly investigated and a report forwarded at once to the office of the Chief Officer of Health.

There are a number of improvements that require to be made in different parts of the District, and they are improvements that the Councils realize the need of, but they hesitate to place additional burdens upon the people or to ask them to assume them on account of the numerous calls upon the citizens for patriotic funds and other worthy objects incident to the continuance of the great war. The money market is tight and the interest rate very high, and during the period of the war I have thought it wiser not to urge too strongly upon the various councils the expenditure of any but very reasonable sums of money until financial matters improve. We are hopeful, though, that with the incoming year peace may be once more restored to the Empire and that then we shall be able to pick up the loose threads of public health work and carry needed reforms to a satisfactory and successful conclusion.

On the whole, the year's work, while not spectacular, has been satisfactory and the foundation has been laid by means of educational and publicity campaigns for more advanced work in the ensuing year. After all the most important aspect of public health work is the educational aspect. We are trying to interest the people in the work and explain to them what we are anxious to have done and why we are asking for the reforms. We are doing this by means of articles to the press, addresses at different gatherings of the people, moving picture shows and in fact in any way that we can get the message to the people. We cannot always get results at once, but the effect of this educational progress will be felt in time and the desired results achieved.

I have always been a firm believer in the idea that we should begin to educate the children in matters relating to public health. Looking to this end I am urging on medical officers of health when they visit schools to give a talk to the children on how diseases spread—with special attention being paid to contact infection. I never fail to do this myself when visiting any of the schools—Public or High, Private or Separate.

As an instance of what some of the municipalities are doing I might mention the Town of Paris. At that place nothing had been done for a great many years. I have visited Paris a number of times and along with the very energetic M.O.H., Dr. Lovett, I think we have succeeded in arousing the citizens to the need of fresh effort in the public health line—the Sanitary Inspector at the same place is very efficient and is doing his best to have needed reforms carried out. The Town of

Paris has an excellent system of waterworks, the water being collected in galleries and pumped from the large well directly to the distributing pipes. There is also a large reservoir in case of special need. If the town had a proper sewage system and disposal plant, it would be a very pretty and up-to-date place. In the meantime, a good deal of the sewage finds its way in one way or another into the Grand River. There are a number of stores on the main street that are quite close to the River and the closets at the back of the stores are so close to the water that there is no way of cleaning them except out through the stores to the front street. Consequently they are usually cleaned by the contents being thrown into the River. In some places the closets are over the water, and when used the contents fall directly into the River. I have recommended that a sewer be put in on the main street, and that the closets be changed into those of the water carriage system and connected with the sewer—then the contents of the sewer could be treated by a septic tank and not allowed to go into the river in a raw state. This is the plan the Council are seemingly in favour of adopting. In the meantime they are collecting garbage and night-soil and are having manure receptacles installed as fast as workmen can be got to do the work. This is one instance of the work we are trying to do, and many more examples might be added.

DISTRICT NO 4.

Comprising the Counties of Prince Edward, Hastings, Northumberland and Durham, Peterborough and Haliburton, Ontario, Victoria, Simcoe and Muskoka.

GEO. CLINTON, M.D.

District Officer of Health, Belleville.

I hereby beg to submit my fourth annual report (condensed) for my District during 1916.

Detailed reports have been regularly sent to the Health Department.

During the year I have visited thirty-one towns and villages, fifteen townships, ten hospitals, six gaols, five asylums, eight houses of refuge, five armouries, four children's shelters. In many places several visits were made to assist the local authorities in special work.

Many places, after a thorough survey the previous year, could be attended to by correspondence with local boards.

COUNTY COUNCILS.

In January I met and addressed the County Councils of Simcoe, Ontario, Victoria, Northumberland and Durham, Peterborough and Prince Edward.

Kawartha Summer Resorts.—Kawartha Lakes, Viamede.

Stoney Lake.—Mt. Julien, McCracken's, Kawartha Park, Glenwold, Burleigh Falls.

Buckhorn.—Buckhorn House, The Windsor.

Muskoka Lake.—Beaumaris, Milford Bay, Roseneath, Hutton House, Cedar Wild, Searchiff, Ross Clair, American House, Swastika, New Windsor (at Bala).

Lake Joseph.—Prospect House, Pt. Sandfield, Elgin House, Pinelands, Belmont, Hamills Point, Staney Brae, Barnsdale (condemned), Gordon Bay House, Dickenson House, Stanley House.

Lake Rosseau.—Nepahwin, Woodington, Cleveland House, Chiltona House, Paington House, Thoril House, Morinus, The Bluffs, Royal Muskoka, Earnscliff, Maplehurst, Rossmoyne, Monteith House, Rostrevor, King’s Park, Waskada, Maple Leaf House, Fife House, Windermere, Ingleside.

Port Carling.—Port Carling House, Beverley Lodge, Algonquin, Oak Crest.

Sparrow Lake.—Methodist Mission, Roehl House, Vanomi, Mount Royal, Franklin House, Delmonte, Wiancko, Lake Shore House, Sparrow Cottage, Stanton House, Winona, Uneeda Rest, Lake View, Idle Wyld, Peninsula Farm.

Georgian Bay.—The Royal, Victoria, Cottage Resort, Point Pleasant, Winseana, Go-Home Bay, Franceville No. 1, Franceville No. 2, Whalin Island.

Lake of Bays.—Pine Grove Inn, Nor Lock Lodge, Dwight House, Gouldie House, Britannia, Point Ideal, Point Cunnington, Island View, The Hemlocks, Ronville, The Narrows, Gonoseyo, Bay View Farm, The Maples, Garyowen, Wa Wa, Glenmount, Grand View, Burlmary, Langhton House, Idle Wyld, White House.

Presque Isle.—A summer resort near Brighton. Closets mostly all crude and no proper disposal of garbage. I called a meeting of the cottagers and had a committee appointed to see that improvements would be made. The L. B. H. and M. O. H., Dr. Wade, was with me and fully approved of my suggestions.

MUSKOKA STEAM BOATS.

	Septic Tanks.
Sagamo	2
Medora	2
Cherokee	2
Kenosha	1
Islander	1
Ahmic	1
Oriole	None.
Charlie M	“

The Government boats at Peterborough have septic tanks. Young’s boats have promised to have tank for 1917.

PUBLIC INSTITUTIONS.

Asylums.

Cobourg, Whitby, Orillia, Penetang.

Colleges and Schools.

Hastings 8, Northumberland and Durham 6, Peterborough 4, Prince Edward 2, Simcoe 8, Victoria 4, Ontario 5, Muskoka 3.

Factories.

Factories of different kinds all have made an effort to comply with the regulations, more especially the canning factories, and now conditions in general are much improved.

Hospitals.

Oshawa, Belleville, Cobourg, Peterborough 2, Peterborough Isolation, Orillia, Barrie, 1 Isolation for troops; Collingwood, 1 Isolation for communicable diseases; Port Hope, a new building, very modern; Bowmanville, Lindsay, 1 Isolation.

Armouries.

Oshawa, Cobourg, Peterborough, Lindsay and Arsenal, Belleville, Barrie.

COMMUNICABLE DISEASES.

Measles.

No severe epidemic but isolated cases in whole district, except a mild outbreak at Wooler. Special visit to Wooler. These cases are not properly reported, due to laxness of parents and physicians.

Whooping Cough.

Several cases but not reported or quarantined.

Scarlet Fever.

No epidemic; a few isolated cases.

Diphtheria.

No epidemic.

Smallpox.

No epidemic.

Typhoid Fever.

During the month of February about 20 cases of typhoid in Belleville and four deaths. After a thorough investigation it apparently was due to contaminated water supply. Mr. DeLaporte was with me, and with the hearty co-operation of the Local Board of Health chlorine tanks were installed and the disease was stamped out.

SPECIAL VISITS.

Lindsay *re* complaints about armouries. I found everything in good sanitary condition.

Visited Picton in September *re* ice cream parlor, where there was an epidemic of gastro-enteritis among those who had been eating the ice cream. The factory was scrupulously clean and was unable to locate the cause. Had several samples of milk tested. Result negative.

Special Oshawa.—*Re* waste from tannery and woollen mills. Since these visits settling tanks have been constructed. Several cases of anthrax among cattle and the Dominion Veterinary Surgeon has taken charge. One man contracted the disease and died. Another man recovered who had contracted the disease.

Corby Distillery.—Two visits as they were polluting the river by waste from stables, etc. Gave them notice and the manure was all removed without delay. All the alcohol manufactured was being used for munition and the waste from distillery was the washing from grain, mostly flour water. This is a nuisance, but it is a question if injurious to health. Under the circumstances did not feel justified in closing them up.

Trenton.—*Re* blocking drain causing private cellars to be flooded.

Deloro Cobalt Smelting.—By request of the company for advice to make the place more sanitary.

Wooler.—*Re* epidemic of measles and whooping cough.

Special Gravenhurst.—Inspected the four sanitariums and found all satisfactory except the Minnewaska. Here the water supply was not sufficient and the septic tank and tile was broken so that the discharge was going in a small creek leading down into the lake. At that time there was about 80 returned soldiers with tuberculosis. Septic tank was built to accommodate about 40, hence the overflow. My visit to the Minnewaska was in November.

I observe a marked improvement in my whole District. A lack of properly trained sanitary inspectors, and those employed have many other duties and are poorly paid, which is a great drawback. Many of the Medical Officers of Health practically act as Sanitary Inspectors, which should not be necessary if competent Sanitary Inspectors were employed.

DISTRICT NO. 5.

PAUL J. MOLONEY, M.D.

District Officer of Health, Cornwall.

I hereby beg leave to report concerning the duties performed by me as District Health Officer No. 5 District, during the year 1916.

AREA AND POPULATION.

This District comprises the Counties of Lennox and Addington, Frontenac, Leeds and Grenville, Dundas, Stormont and Glengarry, Prescott and Russell, Carleton, Lanark, Renfrew and the City of Kingston.

It has a population of 326,958.

The population is very largely British born, except in the Eastern part along the Ottawa River where French-Canadians predominate.

CONTAGIOUS DISEASES.

During the year there were less contagious diseases than in recent years. We still traced many of our outbreaks, however, to the mobilization of the troops at different points and the consequent travelling to and fro.

Smallpox.

Generally mild in character, and owing to this hard to control. Another result from those recent mild outbreaks, was that many persons strongly objected to vaccination. One influential newspaper in this district unfortunately is a pronounced anti-vaccinationist.

Harrowsmith, Olden, Kennebec, Hinchinbrooke, Sharbot Lake, and Calabogie.

The outbreak in all these may be referred to together. The outbreak began probably at Harrowsmith in Portland Township, County of Frontenac. It was mild in character and before being clearly recognized had obtained a good hold all along the Kingston and Pembroke Railway as far as Calabogie.

Good work was done by Dr. Geddes, of Verona; Dr. Barker, of Parham, and Dr. O'Reilly, of Calabogie, Health Officers, in stamping out the epidemic.

Elgin.

A sporadic case occurred near Elgin, Leeds County, and was well handled by Dr. Dunn, M.O.H.

The means used in stamping out the disease in all cases were quarantine, vaccination and disinfection.

Infantile Paralysis.

A few cases, evidently sporadic, of this disease occurred, one each at Elgin and St. Albert, and two in Rockland.

Typhoid.

The number of cases of this disease were much below normal throughout the district except at Smith's Falls, where we had two very severe outbreaks, one in June and one in August and September, each of which were due to a different infective source.

June epidemic, 18 cases. All these cases occurred in railroad men who were using as a drinking water supply the water from the Whitehead well near the roundhouse. The water from this well tested badly and had within 30 feet an outdoor closet available to the public use.

By eliminating other possible sources of infection and reasoning from the fact that there were no other cases in the town for many months, or during the outbreak no additional cases in the homes of the men affected, there remained no doubt that the water from this well was the immediate cause of the outbreak. The well was closed, the patients removed to the hospital and the epidemic ceased. Anti-typhoid inoculation was strongly advised and was used by large numbers of the citizens.

After the June outbreak had cleared up, a sudden virulent outbreak occasioning many deaths and probably a hundred cases occurred in August.

Mostly every one of the cases occurred in people who had been using, for a drinking supply, water from a well known as the "French Hill Well." This was a bored well near a street corner, on each street was a sewer. The well was ordered closed. A regular systematic test was then made of all the wells in the town. The town is built on a bed of shelving rock, and as all the sewers are built through rock, and as they are never watertight, and as there are very many outdoor closets, it was easy to understand why a great many wells tested badly. Mostly all the wells are now closed and sufficient chlorine is used to render the municipal water supply safe. A water filtration plant was again strongly advised. This is one of the situations where a municipal supply generally known to be contaminated was abandoned by ratepayers for a still more polluted well water supply. This town was advised some years ago that filtration of the water was advisable, but the authorities pleaded their inability to finance the needed improvements.

To control any further epidemic a system of chlorination was installed for the water supply. The citizens were directed to boil all water used for drinking purposes. A general cleaning up was ordered and carried out.

A by-law was passed by the Town Council which practically did away with all outdoor closets.

The milk supply was carefully looked into and the milk depots ordered to be more carefully screened and otherwise protected from flies.

The epidemic was cleaned up in about six weeks.

NOTE.—Dr. Easton, the M.O.H., and the Local Board acted most energetically during the outbreaks. Water supply chlorinated after second outbreak.

Lower Ottawa River towns, as Rockland and Hawkesbury, had about the usual number of cases, typhoid being endemic there, as they use the untreated Ottawa River water for drinking purposes.

Scarlet Fever.

Not so many cases as in 1915. The disease was pretty wide spread, however, and was of a mild character.

Diphtheria.

Not many cases reported, no epidemic except at Rockland where it is endemic.

Measles.

Widespread but rather mild.

HEALTH EXHIBIT.

To promote and interest in Public Health work and for instructional purposes, the Provincial Board sent the Public Health Exhibit into the district. Judged from the attendance and the interest taken in the meetings, it was a great success.

Over thirty thousand attended the different meetings, which owing to the restricted size of the public halls, generally required from two to three meetings at each place.

The locations visited were Rockland, Smith's Falls, Perth, Pembroke, Eganville, Renfrew, Arnprior, Casselman, Vankleek Hill, Hawkesbury, L'Orignal, Westboro, Eastview, Almonte, Carleton Place, Morrisburg, Iroquois, Cardinal, Prescott, Chesterville, Winchester, Cornwall, Gananoque and Napanee.

The Grand Trunk Railway Co. kindly loaned two films of Canadian views which were well received.

Correspondence.

Most of the Local Health Officers and Boards of Health and many others consulted the office frequently with regard to sanitary matters, over 800 letters being sent out.

Special Conditions Dealt With.

The Town of Rockland has one of the highest death rates in the Province. Typhoid and other contagious diseases seem endemic there. The water supply used by the people is drawn from the Ottawa River and used untreated. It is a lumber

town in the sense that the only manufacturing establishment is a large lumber mill. I have visited this town more frequently during the year than any other locality in my district. I have not had very much success, but I hope that by means of Public Health lectures, the locating here of a visiting nurse, and the filtration or chlorination of the water supply, to do better in the future.

Westboro.—A condition exists above the City of Ottawa and along the Ottawa River which is a constant menace to the health of the inhabitants and also to the City of Ottawa. Some 10,000 people are scattered along a few miles without sewers or municipal water supply.

In many cases very primitive accommodations are supplied but in most cases an attempt has been made to have modern conveniences. Resulting from this general condition the water supply of the people themselves is constantly menaced, while from their situation on the river they are a constant danger to the Ottawa City Municipal supply.

I have inaugurated a campaign in conjunction with the Health Officers of Ottawa and Westboro to abate the above conditions, which I trust will be successful in the near future.

PEMBROKE WATER SUPPLY.

The Town of Pembroke has installed a water supply at considerable expense for a town of this size.

The intake some years ago was greatly extended until now it is perhaps the longest intake in Canada.

Twelve miles above and on the river is the big Petawawa Military Camp.

The camp has a water and sewage disposal plant of its own.

It has been a burning question for years with Pembroke the manner in which the military authorities conducted the sewage disposal plant. I frequently inspected this disposal plant and whether from not being of sufficient size to take care of the work expected or from want of care in its operation, the results achieved were not satisfactory. During July, 1916, when owing to the large military camp the plant was greatly taxed, matters got much worse and eventually the beds refused to work.

The military engineers had foreseen that the plant would not be adequate and had prepared a new unit. This unit was not properly constructed and proved of little, if any, assistance in taking care of the sewage. Eventually the sewage was allowed to run in an untreated state directly into the river.

Representations were immediately made to the military authorities in Ottawa and no redress being forthcoming, the Provincial authorities were appealed to. This was effective and for the balance of the season the sewage was fairly well taken care of.

The Town of Pembroke will watch jealously any laxity of the authorities at the camp in the future.

Other conditions in most cases requiring at least one personal visit:

Carleton Place.—Dispute, *re* presence of livery barn too near a dwelling.

Glen Nevis.—Improper interment in a cemetery.

Perth.—House of Refuge.

Smith's Falls.—Nuisance caused by swale above the town.

Brockville.—*Re* garbage disposal plant.

Lansdowne.—Complaint, *re* river cottages.

Cardinal.—Nuisance caused by certain ditches.

Westport.—Sewage system.

Gananoque.—Complaint *re* river cottage.

Elgin.—Nuisance *re* cesspools and unsanitary dwellings.

Augusta.—Tuberculosis in schools and the closing of the schools from this cause.

Prescott.—Buckley Estate nuisance and sewage by-law.

Napanee.—Suit, *re* removal of nuisance and sewage disposal plant.

Casselman.—*Re* appointment of M.O.H.

Rockland.—Sewage nuisance, water supply, etc.

Renfrew.—Water supply.

Petawawa.—Nuisance, piggery.

Pembroke.—Water supply, slaughter houses.

Osnabruck.—Selling diseased meat.

Cornwall.—Establishment of Isolation Hospital.

Ottawa.—Mica factory nuisance, water contamination, etc.

Westboro.—Water and sewer questions.

East View.—Extension of cemetery, slaughter houses, ice cutting, etc.

Winchester.—Establishment of sewage system.

Morrisburg.—Contamination of sewers.

Iroquois.—Sewers.

Harrowsmith.—Dispute, *re* M.O.H. salary. Smallpox.

Kaladar.—Unsanitary premises.

Kingston.—Unsanitary dwellings, overcrowded dwellings, etc.

Besides the above, all public institutions, such as Asylums, Penitentiaries, Hospitals, Houses of Refuge and Homes, Orphanages, and County Jails, were carefully inspected and a full detailed report made to the Provincial Board of Health.

MILITARY WORK.

For a short period owing to scarcity of sanitary specialists, I had charge of sanitation at the artillery camp at Petawawa as assistant director of Medical Services.

Afterwards I was able to render considerable service by aiding in and examining recruits and looking after the sanitation of many of the frontier guard posts. These latter services were rendered gratis to the military authorities.

DISTRICT No. 6.

Comprising the districts of Nipissing, Parry Sound, Sudbury, and Temiskaming.

W. EGERTON GEORGE, M.D.

District Officer of Health, North Bay.

I have the honour to submit for your consideration the fourth annual report of District No. 6 comprising Nipissing, Parry Sound, Sudbury and Temiskaming.

During the year I travelled 28,267 miles at an expense to the Department of \$1,055.21. Of this mileage 16,913 was within this district and the expense incurred therewith was \$769.77.

In visiting the different municipalities during the past year, appointments were made to meet the Health Officials and Boards of Health as formerly as an invitation was almost invariably the inspiration of the visit. By meeting the Health Officials it was usually possible to locate their difficulties and to assist or advise in a solution. Indeed, it is to be regretted that so large a part of my time is occupied in satisfying municipal requests since there is reason to believe that many serious matters are being overlooked because of lack of time to make sanitary surveys of a more complete character. I have been aware that several small municipalities required my attention in the way of encouragement and assistance to arouse them to the seriousness of the menace in their delapidated privies; but it was impossible to get to them in time to get anything done last season.

COMMUNICABLE DISEASES.

During the past year I received these returns of the following diseases.

	Cases.	Deaths.
Typhoid	221	22
Diphtheria	48	2
Measles	586	9
Tuberculosis	6	12
Scarlet Fever	35	0
German Measles	6	0
Whooping Cough	11	9
Meningitis	2	7?

It is very probable that five of the meningitis deaths were intended to mean deaths from all other causes as they were all reported on one card on April 6.

Every indication that but little attempt is being made to report the tubercular cases is evidenced by the fact that we have had twice as many deaths reported as cases for the year, which I think you will agree is far from the degree of perfection desired.

It is quite apparent that Health Officers are not recognizing the seriousness of whooping cough. There were nine deaths from this disease; its total being surpassed only by typhoid and tuberculosis and yet but eleven cases were reported. Undoubtedly there were many hundred cases. Surely it is advisable that a stricter quarantine be maintained over this disease.

There were three important epidemics of measles at Copper Cliff, Parry Sound and Burk's Falls. One hundred and sixty-three cases were reported from Copper Cliff with four deaths; eighty-six from Parry Sound with two deaths; one hundred and six from Burk's Falls with no deaths. I visited Burk's Falls and Parry Sound during the epidemics. In each of these towns the difficulty was in getting reports of the cases before the rash. It is to be hoped that by sending all children home from school who show the slightest throat irritation and cough, and by reporting them to the Medical Officer that considerable control may be maintained over the disease.

Of the 221 cases of typhoid, 187 of these occurred in Parry Sound; and of the 22 deaths, 19 occurred in Parry Sound. A large proportion of the remainder undoubtedly got their infection here and carried it to the neighbouring communities. The outbreak was purely a water-borne epidemic. It is noteworthy that as District Officer I had pointed out the danger of this water supply in 1913 and urged action on the part of the council but without success. I then had the Chief Officer take the matter up. He had the sanitary engineers of the

Department make a report which made the gravity of the condition more apparent. With this additional evidence it was still impossible to get action on the part of the council. Shortly after the epidemic began in the early part of the year a chlorine plant was installed but there was evidence of inefficient management. They apparently seemed anxious to correct any leakage but I feel certain that the supervision of this plant was very weak as the disease remained all year with the exception of June and July. In August after the summer vacation there was another outbreak with eight cases within the month, in September ten cases and in October eleven. I am convinced that if this plant is run efficiently full control of the water infection can be maintained. Vaccination was recommended and tried but it was impossible to get second inoculations. The sudden rise in the incidence of the disease during the fly months (August, September and October) was carefully noted. This seemed to throw important stress on the insanitary privy. An effort was made to correct this but with little encouragement. When the Sanitary Inspector took police court action against certain people for not complying with his orders to construct fly-proof privies, the case was dismissed with a warning. A more serious and discouraging state of affairs could hardly be imagined; and it is little wonder that progress was small. I have offered personal assistance in prosecuting these cases but an arrangement has not yet been arrived at.

An extension of sewers with compulsory connection is urgently advised as a means of getting rid of a number of their open closets.

The weekly reports of communicable diseases which you have been forwarding for the past two years have been of much service in keeping tab on the location of epidemics; and where information *re* epidemics come from other sources we are able to ascertain by the presence or absence of these returns whether the secretaries of Local Boards are neglecting this duty. By this means I have been able to locate several municipalities from which no returns have been received and others where they were very incomplete.

It is a matter of regret to the District Officers that they are not able to show statistical evidence of a decreasing death rate from preventable causes. The importance of conserving our infant population is impressed upon us by the enormous sacrifice of Canadian lives on the battlefields of Europe. Facts regarding the decrease in the number of epidemics, the number of cases and the number of deaths can only be shown by having access, also, to birth and death returns. I would, therefore, strongly recommend that the District Officers be provided with all birth and death returns for their respective districts. If the original cards are not filed in the Department, I would advise that these be forwarded along with the weekly returns of communicable diseases.

WATER SUPPLIES.

A number of municipal supplies are rapidly becoming grossly polluted by the number of cottages which are being built on the shores of the lakes which constitute these supplies. This is particularly the case with North Bay and Sudbury. The Mattagami river from which Timmins obtains its supply is becoming polluted by the number of camps above their intake. I have recommended chlorination. The Iroquois Falls drinking water is similarly polluted but they have a chlorine plant already in operation. North Bay urgently needs the protection of a chlorinating system. The danger of this supply has been ably pointed out by the Local Board of Health. Each year the pollution has increased; this

year seven cases of typhoid developed. It is to be hoped that the Local Board will ask for a mandatory order to force the installation of such a system before another season. Sturgeon Falls was ordered to provide this protection but I believe that this order was ignored. Further remarks regarding Parry Sound supply would seem superfluous.

SEWERS AND PRIVIES.

I was asked if the building of a sewer at Smooth Rock Falls would be permitted but explained the impossibility to allow any work which did not include a disposal system. Timmins is also contemplating the building of a sewer but as their out-fall would be into the Mattagami river above the intakes of the towns of Jacksonboro and Smooth Rock Falls they were notified that a disposal system must be constructed before sewers would be allowed to discharge into the river. Those asking information of this kind were told to submit all plans and specifications to the Provincial Board before proceeding with any of the work.

In Parry Sound, Cobalt, Haileybury and New Liskeard where the condition of the privies is very poor the extension of their sewers and compulsory connection is very desirable. An effort at the standardization of these out-houses and the regular collection of the night-soil has been repeatedly advised. The Local Board in Haileybury took the matter up and sent a recommendation to the council, but allowed it to drop there.

North Bay is slowly proceeding with their trunk sewer which when complete will provide new connections for nearly a fifth of the population.

Parry Sound has had engineers at work providing a comprehensive scheme which they will be able to build to.

DAIRIES AND MILK SUPPLIES.

Towns and villages of less than three thousand population have difficulty in getting a reasonably good supply of clean milk. Rarely is the dairy inspected or the milk tested for dirt. If, however, these dairies are supplying any of the larger towns they are maintained at a fair standard by the inspection of the officers of these towns. This is undoubtedly the case at Powassan. The dairies at Parry Sound, Burk's Falls, and Englehart produce almost invariably the dirty product mentioned above. In some few instances the dairymen have taken the initiative and introduced pasteurizing plants, provided modern equipment, tested cows for tuberculosis or constructed their byres on the most approved plans. Such effort should be rewarded and I have strongly recommended certain Health Officers to have their dairies scored and thus give such endeavour all the encouragement possible. If the milk of some of the poor producers was put into the poor grades where it belongs, unfair competition with high class milk and high class producers would be removed. As long as this poor product can be sold to an uninformed public as quality goods poor dairies will be the rule rather than the exception. Since the National Commission on Milk Standards have given us a sound and reasonable method of grading, no exception can be taken to it by the dirty producer.

North Bay, Sudbury, Cobalt, Haileybury and Timmins could adopt this method with much advantage to the public and to the high class dairymen.

In New Liskeard, Haileybury and Cobalt, insufficient attention is given to the dairies to maintain a reasonably clean milk. The lack of inspectors who will take an interest in this work seems to explain the weakness.

SANITARY INSPECTORS.

I have continued to point out year after year the incompetency of Sanitary Inspectors which is largely due to the out-of-date method by which they are appointed. Councils continually show a lack of interest and care for the health of the community by the appointment of men without the slightest qualifications for the position. They are willing and even anxious to use this position as a means of bestowing charity. The only credit that the councils deserve is that the case selected is usually deserving of charity. New Inspectors are appointed each year or for a few months with the result that they do not become familiar with what constitutes a nuisance let alone the sanitary needs of the municipality.

Undoubtedly it is the greatest affront to that Board upon which devolves the duty of caring for the health of the community to provide it with such poor tools with which to carry on the work. Surely it would be better that Sanitary Inspectors should be appointed by the Board of Health and continue in office subject to the pleasure of this body. In this manner the spectacle of one of these wards of the municipality making his report to the council, or to certain of its members who have shown such splendid capacity for weighing matters important to the town's health, instead of reporting to the Health Officer and Local Board who are qualified to dedicate reports of such to the waste basket where they belong, will be done away with. The mention of examples of this condition might better be left to private interviews; suffice it to say that they exist in this district.

DISTRICT NO. 7.

Comprising the districts of Kenora, Rainy River, Thunder Bay, Algoma, Manitoulin and Patricia.

Dr. R. E. Wodehouse, Major Canadian Army Hydrological Corps. On active service. District taken over by Dr. George.

Report of Provincial Sanitary Inspector

GEORGE E. YOUNG.

PARRY SOUND SANITARY CONDITIONS.

MARCH 11TH, 1916.

I paid a visit to Parry Sound this week, and learned from the Town Clerk that one hundred and sixty cases (160) of typhoid fever had occurred, with several deaths, since January 1st; am not at all satisfied with the situation there.

The Town has a population of between three and four thousand, which has been increased by the addition of 2,600 workmen, for the establishment of the munition works at Nobel, and very little increased housing accommodation has been provided.

A chlorinating plant has been installed to remedy the water supply, but nothing has been done in the way of cleaning up the numerous boarding houses. A number of them are too filthy for human habitation, and with an air space of from 131 to 240 cubic feet per person.

Last fall, Dr. George, District Officer of Health, and I tried to impress upon the Council that it was imperative to appoint a Sanitary Inspector for that work alone instead of being combined with the duties of Chief of Police. No change has been made so far.

The promised scavenger and garbage by-laws have not been completed.

As the situation stands at present the fever is spreading to the surrounding country, and if a new leaf is not turned over shortly, we will have a situation similar to Cobalt in the early days.

Dr. C. T. Denfield, the retiring Medical Health Officer, stated the other night that conditions were favourable for a serious outbreak of measles also.

I think the situation in Parry Sound is so critical at present, that if a whole-time Sanitary Inspector is not appointed by the Council, the Provincial Board should recommend the appointment of one by the Lieutenant-Governor in Council.

MARCH 27TH, 1916.

Visited Parry Sound the latter part of last week. The Town Clerk informed me that only three cases of typhoid have developed since the 3rd of March.

A scavenger and garbage by-law has now been passed and tenders advertised for. It will not, however, be possible for it to become operative till possibly the 10th of April.

I have thought of going down there for a week to assist the new Sanitary Inspector who is starting his duties next week.

Fortunately, the measles have not increased very rapidly, and the situation is now handled by Dr. Mason, the new Medical Health Officer.

Extra accommodation will have to be provided, when the warmer weather arrives, for the large increase of population. It is reported that the Nobel people are going to build fifty houses for their employees. If they do, it will be a great benefit.

APRIL 10TH, 1916.

Visited Parry Sound last week and accompanied their new Sanitary Inspector, Mr. O. J. Crockford, on the rounds of his duties.

A scavenger by-law (similar to that for Sudbury) has been passed, and the contract for performing this work let to E. J. Roach, of North Bay, who, I am confident, will organize the work for them and do it efficiently.

With the object of obviating an increased development of typhoid fever, when the flies arrive, we have notified in the neighborhood of one hundred and fifty boarding-houses, restaurants and private houses to clean up. A number of the premises we found in a very filthy condition.

As their incinerator is not very efficient for burning night soil, the Town purposes securing a sandy place, about two miles out of town, where they will trench the surplus matter; this, of course, will be located where it is impossible to contaminate any waters, etc.

MAY 16TH, 1916.

Although the typhoid fever epidemic in Parry Sound has been abated by using chlorine in the water, I have been afraid of the danger of a further outbreak when the flies arrive.

I visited Parry Sound, therefore, again during the last week, re-inspecting certain premises and taking sedimentation tests of milk and inspecting the dairy barns.

There appears to have been so little sanitary supervision in the past, that when their Sanitary Inspector gave owners of premises notice to clean up, in some cases no attention was paid to the order. Some discipline appeared necessary, so Sanitary Inspector Crockford laid informations against seven of the worst offenders, and secured five convictions. Mr. Taskey, Crown Attorney, took charge of the prosecutions. On account of the sickness of the Police Magistrate, Messrs. J. C. McLean, J.P., and Mayor J. Dwier heard the cases.

Speaking of prosecutions, I wish to mention an incident that occurred. A man had a number of hogs penned less than 100 feet from a dwelling. The pens were very filthy (all of which the Inspector and I proved), and, while Mr. McLean was for conviction, the Mayor told the Court he would not convict on our evidence (*i.e.*, evidence of Sanitary Inspector) without complaint from other citizens, despite the fact that Section 73 of the Act and Section 20 of Schedule B. were called to his attention.

We made nine sedimentation tests of milk from the different dairy barns, and found five samples fair and four very dirty.

None of the dairies visited showed conditions (construction of barns or the nature of appliances used) conducive to the production of clean milk. Instead of going to the Medical Health Officer and having their dairy and other premises inspected for a license, dairymen have been allowed to pay the Town Clerk twenty-five cents and secure licenses without any further ado.

DECEMBER 11TH, 1916.

While in Parry Sound last week I had their Sanitary Inspector accompany me and visited several places in town, and also their public dumping ground.

While there is much to be desired yet in the way of sewage disposal, etc., wonderful changes have been made for the better in the past year, and many residents are learning to obey the sanitary by-laws.

The Medical Health Officer reports that no new cases of typhoid fever have occurred in the last six weeks, something very unusual at this time of year for Parry Sound.

BEAR ISLAND—MEASLES.

SEPTEMBER 26TH, 1916.

Bear Island is situated sixteen miles up the river from Temagami station, on the T. & N. O. Railway; it has an area of six and one-half miles, where thirty-two families reside, making a population of 136, of which 52 are children.

I found that 45 of the 52 children had the measles lately. Two deaths had occurred among the children, but as there had been no physician in attendance, it could not be learned that measles were the cause.

About one half of the inhabitants are Indians, who, in the absence of any person in authority, mingle with and travel around among the people on the islands, spreading the disease very rapidly, so I quarantined the whole island and secured two constables to keep them within the bounds.

I made arrangements for the few American tourists left, to leave without coming in contact.

The inhabitants will get their supplies as usual at the Hudson Bay store on the island.

I would suggest that Mr. H. G. Woods, Hudson's Bay Factor, be appointed a registrar of vital statistics, as he is in touch with the whole district.

When here I discovered a case of measles in Temagami, and, as the family had no way of isolating the patient, I quarantined the whole family, securing a man to serve them with the necessaries.

OCTOBER 14TH, 1916.

Quarantine for measles at Bear Island, Temagami Reserve, was raised on Monday the 9th instant, and the premises disinfected. There have been no further deaths since my last report, and with the exception of some minor matters the patients seem to have recovered nicely.

The total number of cases as near as could be estimated were two adults and fifty-one children, making a total of fifty-three. All the rest of the inhabitants are reported to have previously had the disease. One of the constables I had looking after the quarantine got the chance of higher wages, and left the island against my express orders. He has now billed me with the time he put in, which I have refused, and feel disposed to prosecute him for breaking quarantine.

SANITARY CONTROL, NORTH BAY WATER SUPPLY.

OCTOBER 16TH, 1916.

The source of water supply for North Bay is situate in an adjacent municipality over which North Bay has no sanitary control. Effort on the part of the town to obtain sanitary control of the area has been opposed by the Township of Widdifield and the summer residents. During the last year several cases of typhoid fever have been traceable to the water.

It seems that North Bay has offered to do the scavenger work of a portion of the Township free if the Township will make certain improvements and have the district cleaned up, but the Township has neglected to do anything. By

resolution passed at the last meeting of the North Bay Council they asked me to make a sanitary survey of the water supply area and take such action as would compel Widdifield Township to cease polluting the town water supply.

Last Wednesday I made an inspection and reported to the North Bay Council, stating I would take such further action as you may advise. The report under date of October 14th, 1916, is as follows:—

Gentlemen,—In compliance with a request from your Town Clerk, and accompanied by Messrs. Alex. White and Malcolm Angus, Sanitary Inspectors for the Town of North Bay and Widdifield Township, respectively, I made a sanitary survey of Trout Lake from which the water supply for the town is taken.

We started at the source of Lee Creek and followed it over a mile to its outlet in the north-east bay below the station. Then we followed a small stream coming in near the same spot and running back towards the Lounsbury road. We also visited nine summer cottages between there and One Mile Bay. Coming back to the Smelter property I inspected all the properties, including the two mills, and to a distance of 500 feet south from the lake at this point, also Hughes and Kettle Islands.

Lee Creek runs through a farming district where animals have free access, and is also a watering place for teams where the road crosses near the mouth. Quantities of animal excrement reach the water supply from this source, also both human and animal excrement enters from the small stream further up where I found a pig pen, two pit closets, and dirty premises—all within easy drainage of the water supply.

The nine cottages visited in the Park were all unoccupied, but from location, construction and care taken, I do not believe any serious pollution would reach the water supply from them. Starting at the Smelter property going south between the T. & N. O. Railway and the lake, I found nineteen closets. Six of them were pits, one chemical, five pits uncleaned with cans, and seven clean with cans.

With the exception of five, the closet buildings were entirely unfit for the purpose intended. Some of them were built over unemptied pits with merely a wooden floor with the cans set on top. In this district we also found three stables with large accumulations of manure, some of which had been there for years.

The buildings and stables are all at considerable elevation above and situated near the lake, and their drainage can be traced to the water supply.

The two Mills should have some sanitary system, for use of the men, established where it is convenient, as considerable pollution must reach the lake from the excrement of careless or indifferent employees.

There is no burner at the sawmill, and large accumulations of sawdust, etc., are deposited in and around the lake at this point.

In passing up and down the T. & N. O. Railway this summer, I noted that the water lot owned by the Corporation of the Town of North Bay was generally nearly covered with logs, and on examination last Wednesday, I found the bottom of lake at this point covered with bark and other debris.

In the district from the Smelter going south and adjacent to the water supply, the only evidence of sanitary supervision is that iron buckets were placed in some of the closets, and these had evidently been emptied lately; with this exception the conditions were very unsanitary.

My reason for emphasizing the Smelter area is, that I believe the bulk of the pollution reaching the water supply is from this point, and that the Municipality of Widdifield has been negligent in their duties.

The requirements of the by-law for the disposal of garbage, etc., as passed on the 8th day of July, A.D. 1916, by the Township of Widdifield provide for wooden boxes underneath the closet seat, in a certain prescribed area, but do not provide how these are to be cleaned nor is any provision made for the disposal of the contents of them. My experience is that the iron bucket system is the only efficient method of handling this matter either for winter or summer.

In summing up the sanitary situation in and around the water supply, I have found conditions grievously neglected along the west end of the lake, where everything is wide open for a possible serious pollution of the water supply.

I would advise that the Town of North Bay apply at the next sitting of the Legislature for sanitary control of their water supply, so as to be able to handle conditions with their own machinery.

I will lay this report before the Provincial Board of Health and ask their advice on what further action I may take in assisting to remedy this matter.

DEPOT HARBOUR.

DECEMBER 11TH, 1916.

Complaints having been made that very unsanitary conditions existed at Depot Harbour, I visited that point. Depot Harbour is a portion of the Indian Reserve and is leased for a long term of years to the Grand Trunk Railway. Hotels, schools, boarding houses, and all other buildings belong to the Railway Company.

In the part called Dago Town, consisting of between fifty and seventy-five hovels, I found wells at their very doors, no closets, the inhabitants using the rocks for that purpose.

In the centre of the town there is a septic tank in a fenced-in lot of about one acre, with the contents flowing over the adjacent ground in all directions. Apart from being very dangerous through flies in the summer time, the odor in summer must be very offensive.

I advised L. J. Coleman, Divisional Superintendent of the Grand Trunk Railway at Ottawa, that immediate steps must be taken to have these matters remedied, also to have a garbage system established for the village, making it compulsory for the residents to remove the old cans, garbage, etc., which I saw lying around in quantity.

All of which is respectfully submitted.

GEORGE E. YOUNG,

Provincial Sanitary Inspector.

Report of the Provincial Sanitary Engineer

F. A. DALLYN, B.A.Sc. C.E., (Tor.)

TORONTO, July 23rd, 1917.

Chairman and Members of the Provincial Board of Health, Ontario.

GENTLEMEN,—I have pleasure in presenting herewith my annual report for the year 1916, including several reports of Mr. DeLaporte made under your direction in connection with the work of this Department.

Applications approved by the Board relating to sewerage and waterworks systems and extensions thereto, amounted in the year 1916 to the sum of \$2,010,070.42 (estimated costs) and is summarized as follows:

Sewer Extensions	123	applications—estimated	cost	....	\$1,226,260 90
Sewage Disposal Works	7	"	"	....	97,872 00
Waterworks Extensions	56	"	"	....	369,035 42
New Water Supplies	4	"	"	....	316,902 10
Total Applications	190	"	Total estimated	cost..	\$2,010,070 42

The work entailed by consideration of these applications was somewhat less than in 1915 owing to the marked decrease in expenditures, that of 1915 being \$4,679,496.94 as against \$2,010,070.42 for 1916. The total number of applications, however, does not show so great a difference rising out of the fact that the smaller works and works of necessity have been carried on even with the difficult labour conditions now confronting municipalities in Ontario.

An effort has been made this year to prepare standards for Municipal Records, Proposal for Bids and Estimates, Bid and Estimate, Bond, Contract and Specifications for Sewer Construction together with certain standard details of construction. A tentative proposal is included elsewhere in this report. Standard methods and specifications are suggested in order that the work of the various municipalities may be correlated and to permit of a scheme of Provincial supervision going into operation which is rendered doubly difficult when the contractor's liability is subject to change by reason of the specifications being different for each municipality. With uniform methods it should be possible for a Government Inspector to deal directly with the interpretation of the specifications and with the contractor. Under existing conditions the matter has to be referred back to an engineer whose responsibility frequently terminated with the acceptance of the plans and letting of contracts.

The question of regulations governing the installation of plumbing and sanitary conveniences in the Province of Ontario has been considered and a tentative proposal has been prepared. A standard specification for soil pipe is suggested regulating the sizes, dimensions and weights of soil pipe. This latter is much needed, for competition amongst the manufacturers of drainage fittings has lead to all sorts of artifices in the shortening and lightening of fittings in the endeavour to make, what appears to the ordinary purchaser, a cut in price. Competition can be taken care of either in price lists or on discount sheets. Standard sizes and weights of fittings will be most advantageous for the trade. Standards of the Province of Ontario will doubtless control fittings in the Eastern portion of the Dominion.

A report has been completed with the assistance of Mr. Duff upon the manufacture of sewer tile pipe in the Province. This report is of general interest to city engineers and inspectors in charge of sewer construction throughout the Province. I would recommend that this report be included in the published report of the Board and that it be printed separately for distribution to those interested.

The situation with reference to water borne typhoid fever in the larger towns is very satisfactory. The accompanying table shows a gradual elimination of typhoid for the past few years. *Supervision on the part of the Board without the support*



Laying a 33" dia. sewer in quicksand, Peterboro', Ont.

of the municipalities in continuing the dosage of chlorine required, is unsatisfactory and largely explains why further decreases have not been realized in some instances. Chlorination is not always sufficient treatment and further purification is desirable notably at Belleville, Kingston, Sault Ste. Marie and Windsor. With municipal support it is possible to eliminate typhoid as a serious factor in our vital statistics. The death rate in the Province of Ontario from typhoid fever exclusive of the cities and towns was 8.0 per 100,000 of population in 1916.

TABLE No. 1.
TYPHOID FEVER IN ONTARIO CITIES.
Rate per 100,000 population.

The following rates do not appear to be greatly influenced by water supply.

Cities.	1908	1909	1910	1911	1912	1913	1914	1915	1916	City Average 1908-16	Treatment, Source of Supply.
Brantford	53	24	72	77	17	24	11	11	24	34.7	Chlorination, 1914.
Fort William .....	.....	.....	.....	35	33	30	21	22	9	25.0	None, Loch Lomond.
Galt.....	43	11	42	31	19	27	17	0	25	23.8	None, Springs.
Guelph	21	69	27	13	6	6	12	12	0	18.4	Chl. 1915, Springs.
Hamilton.....	19	16	15	24	8	14	7	6	4	12.5	None, Lake Ontario.
Kitchener	15	15	43	7	19	6	11	5	0	13.4	None, Wells.
London.....	12	6	4	17	10	3	9	0	2	7.0	None, Springs & Wells.
Niagara Falls.....	.....	.....	.....	.....	.....	.....	.....	9	27	18.0	Chl. 1913, Niagara R.
Ottawa	31	24	28	.....	.....	19	17	24	18	23.0	Chl. 1912, Ottawa R.
Peterborough	18	6	29	17	10	10	25	14	14	15.9	Chl. 1916, Otonabee R.
Port Arthur .....	.....	.....	.....	.....	.....	.....	.....	5	21	13.0	Chl. 1913, New source, '14
St. Catharines .....	.....	24	24	71	22	27	6	0	22	21.7	Chl. 1914, Welland Canal
St. Thomas.....	49	34	20	19	19	50	0	29	29	27.6	Chl. 1913, Filters, Wells
Stratford.....	14	34	34	13	20	6	6	17	12	17.3	None, Wells.
Toronto	21	25	46	24	14	13	9	2	7	17.8	Chl. 1909, Filters 1912-16
Woodstock.....	32	21	21	42	30	10	0	10	28	20.6	None, Springs.
Average by years	25.2	23.7	31.1	30.0	17.4	17.5	10.0	9.8	13.4	19.8	

NOTE.—A total city population of 924,610 is benefited by the rates of 10, 9.8, 13.4, for the years 1914, 1915, 1916 respectively.

TABLE No. 2.
TYPHOID FEVER IN ONTARIO CITIES.
Rate per 100,000 population.

The following rates appear to be influenced by infected water supplies.

Cities.	1908	1909	1910	1911	1912	1913	1914	1915	1916	City Average 1908-16	Treatment of Water Supply.
Belleville.....	71	40	50	19	37	18	17	63	81	44.0	Chlorination 1916
Chatham	49	68	39	38	44	58	16	8	46	40.6	Filters 1895
Fort William	111	106	83	Protected.						10.0	New Source 1910
Kingston	31	31	78	26	32	25	43	28	5	33.2	Chlorination 1912
Niagara Falls	84	26	60	90	44	85	34	protected		60.4	Chlorination 1913
Ottawa .....	.....	.....	.....	101	108	Protected.				104.5	Chlorination 1912
Port Arthur	138	164	178	121	163	146	50	protected		137.1	New Supply and Chlorination 1913
Sarnia	110	82	101	148	139	45	26	34	60	82.7	Chlorination 1913
Sault Ste. Marie	68	90	154	280	85	127	84	24	31	116.6	Chlorination 1913
Windsor	63	56	49	34	38	10	27	35	29	37.8	Chlorination 1913
Average by years.	80.5	73.6	88.0	102.1	76.6	64.7	37.1	32.0	42.0	66.2	

NOTE.—A total city population of 95,017—approximately 8 per cent. of urban population—is effected by the average rate of 42 deaths per 100,000 of population in 1916.

The rapid development of certain industries and particularly the manufacture of explosives throughout the Province has caused unsanitary and congested living conditions in isolated sections and it would be well to enlarge the regulations governing housing accommodation in boarding camps. War contracts during the past two years have been used as an excuse for all sorts of haphazard planning, congested housing conditions and wholesale discharge of trade wastes into some of the waters of the Province. These conditions in themselves might have been tolerated had proper provision been made for sanitary inspection by municipal authorities benefiting by the congestion or by the munition contracts. As it was, work of this kind had to be undertaken directly by officers of the Board and it was only after outbreaks of fever had occurred, such as at Parry Sound, that any proper appreciation was had of regulating the conditions under which congestion could be permitted.



Straightening the steel sheeting, Peterboro', Ont.

The work of the Department has required visits to the following places during the course of the year:

January.—Sarnia, Davenport, Iowa, Chicago, Ill., Milwaukee, Wis., and Guelph.

February.—Stratford, Sarnia and Peterborough.

March and April.—Sarnia, Washington, D.C., Baltimore, Md., Niagara-on-the-Lake, Sarnia, Milwaukee, Wis., Renfrew, Orillia and Guelph.

May.—Rockland, Ottawa, Pembroke, Sault Ste. Marie, London and Owen Sound.

June.—London, Pembroke, Renfrew, Ottawa, Winchester, Niagara Falls, Buffalo, Niagara Falls, Thorold, Detroit and Orillia.

July and August.—Baltimore, Md., Guelph, Lindsay, Sudbury, Coniston, Ogdensburg, Smith's Falls, and Ingersoll.

August and September.—Oakville, Burlington, Peterborough, Sault Ste. Marie, Camp Borden, Collingwood, Georgetown, Petewawa, Quebec, and Strathroy.

October and November.—Berlin-Kitchener, Parry Sound, Guelph, Ottawa, Kingston, Oshawa and Napanee.

December.—Westboro.

Such reports as appear of general interest arising out of these visits are included herewith.

I have the honour to be,

Yours sincerely,

F. A. DALLYN,
Provincial Sanitary Engineer.

SEWER EXTENSIONS FOR THE YEAR 1916.

Municipality.	Date.		Estimated cost.
Arnprior	Nov.	29th.....	.....
Barrie	Nov.	10th.....	\$550 00
Belleville	Aug.	28th.....	16,617 71
Berlin	Aug.	31st.....	9,300 00
“	Aug.	31st.....	7,176 00
Brampton	July	20th.....	20,030 94
Brockville	Nov.	18th.....	2,608 00
“ (Sewer and Pump Station) ..	Nov.	29th.....	5,178 71
Chatham	Nov.	20th.....	16,127 96
Collingwood	April	12th.....	7,000 00
Copper Cliff (Sewer and Dis. Works) ..	July	3rd.....	28,212 33
Cornwall	Nov.	29th.....	2,500 00
Dunnville	May	16th.....	342 00
“	Aug.	10th.....	3,502 94
Fort William	Aug.	28th.....	888 20
Galt	Aug.	28th.....	1,135 80
Gananoque	Aug.	15th.....	4,000 00
Guelph	July	2nd.....	4,500 00
“	Nov.	2nd.....	805 00
Hamilton	Mar.	16th.....	345 97
“	June	28th.....	356 00
“	July	26th.....	1,060 47
“	Aug.	9th.....	.....
“	Sept.	19th.....	1,101 25
“	Oct.	3rd.....	577 00
“	Oct.	23rd.....	12,944 80
“	Dec.	20th.....	734 10
Kingston	April	26th.....	238 75
“	May	18th.....	173 00
“	Sept.	18th.....	305 45
“	Oct.	31st.....	1,087 95
Leamington	April	10th.....	20,537 72
Lindsay	Sept.	18th.....	7,808 15
London	Mar.	21st.....	4,199 22
“	April	7th.....	10,133 67
“	July	3rd.....	3,268 30
“	July	3rd.....	1,593 21
“	July	3rd.....	1,327 10
“	July	3rd.....	1,799 90
“	July	3rd.....	1,004 57
“	Oct.	3rd.....	929 30
“	Oct.	3rd.....	327 00
“	Oct.	3rd.....	3,635 95
“	Oct.	3rd.....	3,590 40
“	Oct.	20th.....	5,072 55
“	Nov.	14th.....	3,012 77

SEWER EXTENSIONS FOR THE YEAR 1916.—*Continued.*

Municipality.	Date.	Estimated cost.
Lorneville (Tp. Cornwall)	Aug. 18th.....	882 60
Mimico	Dec. 1st.....	14,069 21
New Toronto	May 13th.....	51,235 36
"	June 16th.....	364 00
"	June 19th.....	5,375 00
"	Dec. 14th.....	3,325 48
Niagara-on-the-Lake	Aug. 28th.....	4,064 17
"	Aug. 31st.....	7,489 36
North Bay	June 16th.....	3,744 50
"	Aug. 8th.....	1,249 00
"	Nov. 9th.....	326 60
"	Dec. 7th.....	2,050 00
Oshawa	Aug. 8th.....	2,703 00
Ottawa	Jan. 20th.....	1,460 85
"	Jan. 20th.....	3,238 40
"	Feb. 24th.....	2,848 90
"	Mar. 13th.....	971 86
"	Mar. 13th.....	266 05
"	June 24th.....	853 42
"	July 6th.....	486 68
"	Aug. 18th.....	3,713 99
"	Aug. 28th.....	925 06
"	Nov. 14th.....	1,039 00
"	June 24th.....	5,570 00
Parry Sound	July 20th.....	179 18
Pembroke	Jan. 15th.....	3,341 23
Perth	May 26th.....	595 65
"	Aug. 9th.....	1,167 25
"	Nov. 29th.....	4,219 37
Peterborough	May 1st.....	1,845 98
Port Hope	May 1st.....	458 50
"	June 2nd.....	1,945 41
"	Sept. 26th.....	2,000 00
Renfrew	Feb. 4th.....	4,481 00
St. Catharines	Feb. 12th.....	24,770 24
"	June 24th.....	79,583 71
"	Mar. 13th.....	2,489 02
St. Thomas	Dec. 4th.....	75,565 54
"	June 16th.....	2,614 08
Sandwich	June 16th.....	722 70
"	June 16th.....	743 60
"	June 20th.....	2,258 74
"	June 20th.....	4,516 15
"	June 24th.....	4,307 05
"	July 12th.....	344 24
"	July 20th.....	1,227 60
"	Nov. 24th.....	18,662 40
"	Nov. 29th.....	837 80
"	June 16th.....	3,107 65
Sarnia	July 20th.....	2,520 85
"	Aug. 28th.....	2,398 67
"	Nov. 14th.....	2,685 20
"	Nov. 21st.....	2,253 36
Sault Ste. Marie	July 3rd.....	9,305 00
Smith's Falls	Oct. 16th.....	231 29
"	Nov. 17th.....	16,441 25
"	Dec. 18th.....	1,533 75
"	Aug. 1st.....	1,539 50
Stratford	Aug. 1st.....	1,265 35
"	Nov. 7th.....	617 00
"	Aug. 14th.....	7,500 00
Sudbury	Nov. 14th.....	275 00
"	Nov. 14th.....	700 00
"	Feb. 8th.....	364 05
Thorold	June 8th.....	2,417 00
"		

SEWER EXTENSIONS FOR THE YEAR 1916.—*Continued.*

Municipality.	Date.	Cost.
Toronto	Jan. 4th.....	50,706 00
"	June 16th.....	14,852 00
"	June 19th.....	279,070 00
"	July 20th.....	2,668 00
"	Oct. 18th.....	227,592 52
"	Oct. 24th.....	.....
Waterloo	Sept. 18th.....	3,423 00
Welland	May 6th.....	3,199 14
Whitby	Nov. 27th.....	6,945 27
Windsor	May 19th.....	3,636 85
"	June 29th.....	1,505 68
"	Nov. 11th.....	2,738 45

Total cost of extensions ..\$1,226,260 90

SEWAGE DISPOSAL WORKS.

Brockville (Sewer and Pumping Station) ..	Nov. 18th.....	\$1,872 00
Copper Cliff (Sewer and Disposal Works) ..	July 3rd.....	19,500 00
London	April 18th.....	50,000 00
New Toronto (Sewer and Pumping Sta.) ..	June 19th.....	25,500 00
Tecumseh—(Dominion Cannery)	Feb. 8th.....	.....
Toronto (Women's Industrial Farm)	June 26th.....	.....
Weston	April 7th.....	1,000 00
		<hr/>
		\$97,872 00

WATERWORKS EXTENSIONS FOR THE YEAR 1916.

Berlin	April 25th.....	\$14,795 78
" duplicates	May 30th.....	.....
Chatham	Aug. 28th.....	16,600 00
Cochrane	Aug. 8th.....	788 52
Cornwall	April 13th.....	25,000 00
Essex	Jan. 17th.....	5,800 00
Ford City	July 12th.....	8,625 39
Galt	Sept. 8th.....	2,349 49
Gananoque	Aug. 15th.....	4,000 00
Grantham Township	Aug. 8th.....	9,290 00
Hamilton	Mar. 30th.....	3,291 52
"	June 29th.....	2,021 72
"	Aug. 14th.....	350 00
"	Oct. 17th.....	2,562 38
Kingsville	Oct. 6th.....	5,250 00
Midland	July 5th.....	2,288 00
"	Aug. 28th.....	237 00
"	Sept. 18th.....	858 00
Mimico	Dec. 1st.....	22,586 11
Niagara-on-the-Lake	April 27th.....	.....
Peterborough	Mar. 13th.....	7,370 31
"	April 5th.....	35,364 00
"	Sept. 8th.....	11,330 50
Preston	May 19th.....	325 70
"	Aug. 28th.....	1,876 40
Renfrew	Sept. 26th.....	3,974 90
Ridgetown	Sept. 18th.....	6,028 25
St. Catharines	June 1st.....	5,000 00
Sandwich	May 12th.....	2,047 72
"	June 20th.....	5,967 50
"	June 24th.....	3,520 00
"	July 10th.....	748 00
"	Aug. 21st.....	1,441 00
"	Nov. 24th.....	16,771 60
"	Dec. 1st.....	616 00
Seaforth	Oct. 26th.....	4,248 00

WATERWORKS EXTENSIONS FOR THE YEAR 1916.—Continued.

Municipality.	Date.	Cost.
Smith's Falls	April 12th.....	1,600 00
"	Oct. 16th.....	315 40
"	Nov. 17th.....	3,964 00
"	Dec. 18th.....	276 75
Stamford Twp.	May 6th.....	6,382 00
"	Dec. 21st.....	465 00
Sudbury	Jan. 17th.....	10,813 00
"	Jan. 24th.....	1,096 00
"	Nov. 14th.....	550 00
Timmins	July 19th.....	22,001 00
Toronto	Jan. 4th.....	6,527 17
"	Jan. 15th.....	3,726 44
"	Aug. 21st.....	2,790 26
"	Sept. 19th.....	2,056 27
"	Oct. 31st.....	6,591 64
"	Nov. 6th.....	3,367 47
"	Dec. 7th.....	1,942 14
Whitby	Nov. 27th.....	5,594 23
Windsor	June 24th.....	55,652 06
Total cost waterworks extensions		\$369,035 42

NEW WATERWORKS AND PURIFICATION.

Collingwood	Mar. 17th.....	\$13,000 00
Niagara-on-the-Lake	May 15th.....	11,822 84
Peterborough (chlorination apparatus)	April 14th.....	.....
Tp. of York	Oct. 14th.....	265,062 23
"	Nov. 14th.....	27,017 03
		\$316,902 10

Toronto, Nov. 28th, 1916.

Dr. J. W. S. McCullough, Chief Officer of Health, Ontario, Toronto, Ont.

RE OSHAWA WATER SUPPLY.

SIR,—I have the honour to report in respect to the marginally noted subject as follows:

The water supply of Oshawa has for some time been showing considerable pollution as indicated by the analysis made at the Laboratory of the Board since the middle of 1915. It was thought advisable that a survey should be made of this water supply and on April 19th, 1916, Mr. DeLaporte visited the town and made a report. This report led to the recommendation that chlorination apparatus be immediately installed which was done by the town Engineer and is now in use. Recent reports of Dr. Clinton, District Officer of Health, indicate that considerable trouble has lately been experienced owing to anthrax breaking out in cattle which make frequent use of the stream receiving the tannery effluent, and of pasture lands which have received the droppings of animals possibly at some time infected by the tannery waste. The condition appeared to be one warranting a visit to the town and a more thorough examination into conditions respecting both the disposal of wastes and the purification of the water supply.

PROTECTION OF THE WATER SUPPLY.

On November 20th I visited Oshawa and went over the premises of the principal offenders in regard to the pollution of the creek, that is, The Robson Leather Company, The Scofield Woollen Company and the Oshawa Cannery, and at the

same time visited the sewage disposal works, the pumping station and the water front. To sum up the whole situation in a few words the water supply unquestionably requires further protection, for the reason that it receives periodic pollution from the sewage of the town (which is discharged after sedimentation without disinfection), some considerable pollution from the tannery wastes and wash water from the woollen mills.

I can suggest no better immediate treatment of the water supply than by use of mechanical filters, and I would recommend that proposals be asked both for pressure and gravity types of mechanical filters, and include a proposal for the drifting sand type now in operation at Toronto Island Filtration Works. The chemical used could, I believe, be fed most advantageously by the new equipment now being put on the market by the VerMehr Company, of Toronto, which is a pressure apparatus, solution being controlled by a hydrometer. I would advise the continuance of the use of bleaching powder even after filtration, but I anticipate very much smaller quantities can be used than at present. There will probably be no taste whatever owing to the use of alum with the filter. The chlorine may be fed before or after filtration.

SEWAGE PURIFICATION.

The present devices, that is the detritus chamber and sedimentation tank, appear to be doing a satisfactory work, but both require cleaning. The practise, I believe, has been to discharge this accumulated filth directly into the creek and allow it to find its way with freshets to the water front and possibly to the intake. This is improper and should in future be corrected by the construction of a suitable sludge bed which can be underdrained in the ordinary manner, and after drying, the sludge may be distributed around the sewage disposal area fertilizing the rather fine growth of trees there.

The effluent from the sedimentation tanks should be chlorinated at once and this practise should be continued. It is advisable to provide for the further treatment of the sewage by spraying it over broken stone as is practised in many centres. This will improve the color very markedly and will abate the odour which is complained of at the water front. This odour is due to putrefaction of weeds occasioned by the loss of oxygen in the stream, the oxygen being absorbed by the sewage as it is now discharged.

THE TANNERY.

The Robson Leather Company are quite serious offenders against the Public Health Act, for the reason that they are discharging untreated wastes and polluting the stream seriously to the detriment of the town and of any agricultural interests below. It was not possible in the limited time at my disposal to determine the exact quantity of water being used at the tannery. We are informed, however, that approximately 1,200 hides were being treated per day, which is equivalent to the discharge of three soak pits or fresh water vats 8 x 8 x 6 feet and three lime vats 8 x 8 x 6 feet, together with large volumes of wash water, some dye waste, chrome and periodically some spent liquors from the other tanning processes. The total quantity of water used cannot possibly be less than 51,000 gallons per day. Judging by other tanneries I would estimate it as more nearly 200,000 gallons per day.

For the protection of the stream, and I believe for the direct advantage of the Robson Leather Company in regard to their responsibility as to anthrax, the fol-

lowing waste water disposal works should be immediately installed: (1) Two sedimentation tanks to be constructed in parallel for cleaning purposes, each 15 feet deep with cone bottom and 10 x 10 feet in area, these tanks to receive nothing but the wastes from the fresh water or soak pits and the lime vats, together with the fresh water associated directly with this portion of the process. I understand that there is sufficient lime discharged to satisfactorily sterilize the water of the soak pits if the two are mixed and allowed to stand together for some 18 to 20 hours, which would be made possible by the arrangement proposed. The rest of the wastes except those from the dye vats, together with the overflow from the first two tanks should then be discharged through two other tanks 7 feet deep, 10 feet wide and 25 feet long, the tanks to be both operated normally or one set while the other was being cleaned. It is immaterial whether shallow tanks be constructed or not, provided that the storage indicated can be completely taken advantage of.

The most satisfactory method of taking care of the dye and colored liquids would be to have a small storage tank, one probably holding 1,000 or 1,500 gallons and arranged to flow into the first tanks, that is, the tanks receiving the soak pits and lime vats, the flow from the dye waste tank to be continuous from a small orifice so that the heavy rushes of dye liquor will not go directly to the stream, but will be distributed throughout the twelve hours or so of the working day with the other liquors.

I believe this is all that can be reasonably asked of the Leather Company. This can be constructed for less than \$6,000.00. The treatment recommended will yield an effluent which should not give rise at any time to anthrax in the lower waters provided that the tanks are kept reasonably clean and that the lime vats are discharged so as to effect the water from the soak pits.

THE SCHOFFIELD WOOLLEN COMPANY.

Considerable wool washing is done at this plant and no provision has been made for treating the wash water. I would suggest a concrete tank 6 feet wide and a depth sufficient to have 4 feet of liquor and 20 feet long, the flow to be arranged longitudinally and the tanks to be divided into two sets so as to permit of cleaning one set.

The wastes from the toilets at the Schoffield Woollen Mills should be discharged through tile into ground which can be conveniently made in that neighbourhood by filling in with ashes and other waste material. Under present condition the discharge is by siphon direct to the creek and occasions offence in somewhat the same way as the town sewerage, by depriving a portion of the creek of its oxygen so as to occasion an offensive decay of the weed growth.

THE OSHAWA CANNING COMPANY.

These people appear to be probably the least offenders in respect to the pollution of the stream and doubtless will in the near future be connected to the sewerage system. I would recommend, however, that their waste water be passed through a tank about 10 x 10 x 7 feet so that in case of accident or doing a rush of work, some of the wastes having least value will not be discharged directly into the stream in order to get rid of them. The tank should be so built that when the sewer is laid it will be connected to the overflow of the tank rather than to the drains of the Canning Company.

In concluding my report I should like to repeat an observation made to Mr. Worden, the Engineer, with reference to the existing chlorine apparatus. *The apparatus should be so arranged that the pump operator can start his chlorine solution flowing before starting the pump.* Under the existing methods the pumps are started four times a day and are operated for a period of probably two minutes on each occasion before the chlorine solution is turned on. That means that each day probably as much as 8,000 gallons of water are pumped into the system which have absolutely no treatment whatsoever, and should conditions be such on that day that the sewage is reaching the intake pipe, the water would be highly dangerous. This is a common error made by those in charge of apparatus for chlorination and has in some places led to serious outbreaks of typhoid fever.

All of which is respectfully submitted.

F. A. DALLYN,
Provincial Sanitary Engineer.

Toronto, April 19th, 1916.

Dr. J. W. S. McCullough, Chief Officer of Health, Ontario, Parliament Buildings.

REPORT RE OSHAWA WATER SUPPLY.

SIR,—Acting under your instructions, I made a sanitary survey of the water supply for Oshawa on April 19th in company with Mr. Worden, Town Engineer.

I went over the location of the intake pipe in regard to possible sources of pollution. It has long been a well-known fact that the water from the creek, which passes through the town, occasionally finds its way into the water supply. This has been amply demonstrated this spring when there could be no doubt both from the character of the water and of the suspended solids that the creek water was polluting the supply. As all the sewage from the Town of Oshawa is emptied directly or indirectly into this stream, it is easily seen that while the water supply may not be polluted at all times, it is nevertheless highly charged with sewage part of the time.

Efforts have been made this spring to have the people chlorinate the water in their homes, Mr. Worden having a recipe similar to that of the Provincial Board of Health published in the local papers. This home chlorination is a very unsatisfactory method at best, and I recommend that the town instal immediately a temporary chlorination plant to ensure the safety of the supply while further measures of protection are being devised.

All of the above is respectfully submitted.

A. V. DELAPORTE,
Chemist in charge of the Experimental Station.

RE PARRY SOUND.

TORONTO, February , 1916.

Provincial Board of Health, Ontario, Toronto, Ont.

GENTLEMEN,—Acting on instructions from the Chief Officer of Health I visited Parry Sound February 21st, 1916, to see that the chlorination of the town water was being successfully carried out. When I arrived no chlorine was being added to the water as the apparatus was not complete, but the dosing of the water was started on the morning of February 21st. Chlorination is at present being carried on in as efficient a manner as possible with the apparatus at hand. The dose I ordered was 30 pounds of chlorine to every million gallons of water pumped, or roughly one part per million of available chlorine was added.

Chlorination of this supply alone will not stamp out the epidemic of typhoid fever in this town. Other measures are necessary, first, with regard to the overcrowding. The menace of the universal overcrowding in boarding houses and hotels in this town cannot be overestimated. In one boarding house of five small rooms they provide sleeping accommodation for 120 men, 60 men at night and 60 men in the day time. Imagine meningitis, diphtheria or smallpox starting.

This overcrowding is caused by the indifference of the Canadian Explosives Company to the health and welfare of their employees. Two thousand five hundred men were brought to the town with a normal population of 3,000 people, roughly doubling the population in three months, and to date no extra provision has been made for the accommodation of these men, with the consequences that the housing conditions beggar description. Immediate steps should be taken to make this Company realize its duty to its employees. Secondly, no sanitary by-laws are enforced in this town. Steps should be taken (a) to pass and enforce an adequate sanitary by-law, and (b) to collect the garbage and the night soil from the numerous privies about the town. If these steps are not taken promptly the chlorination of the water will be to some extent futile and the duration of the epidemic will be protracted indefinitely.

Enforcement of the sanitary by-law should be placed in strong hands, who will require vigorous action to stamp out the present epidemic and to prevent an outbreak of some other disease.

I would, therefore, respectfully suggest that the Provincial Board of Health of Ontario take this matter in their own hands and clean this town as it ought to be cleaned.

All of which is respectfully submitted.

A. V. DELAPORTE,

Chemist in charge of the Experimental Station.

REPORT UPON LONDON SEWERAGE AND SEWAGE DISPOSAL AND IN REGARD TO
CERTAIN NUISANCES.

From the Provincial Sanitary Engineer to the Chief Officer of Health for Ontario.

SIR,—I beg to report upon the conditions affecting the extensions of the present sewerage system of the City of London and more especially in reference to the present campaign of Dr. Hill for the abolishing of all outside toilets and the enforcement of the by-law requiring connection to be had to the existing sewerage system.

At the present time the 20-inch syphon connecting the main sanitary sewer to the disposal works is entirely inadequate and no doubt was so for a considerable period prior to 1913. There is a note of the matter in Mr. Chipman's report to the council, under date of April 19th, 1913, in which is the statement that "the 20-inch syphon is now capable of taking only 30 per cent. of the capacity of the sewer and that an additional 30-inch was needed at once." This condition has been brought about by the city's rapid growth and an almost universal custom of connecting roof water to the sanitary system. No action was taken in the matter by the council although the expense of laying such a syphon under the present conditions would probably not be more than \$40,000.

The serious flooding which began to be evidenced in parts of the city was deemed of more importance, and at this time the council, ignoring the recommendation with reference to the syphons, proceeded with the construction of storm sewers, the cost of which was estimated at that time to be in the neighborhood of \$171,000. Mr. Chipman undoubtedly believed a great deal of relief could be afforded the existing system by the system of storm sewers, and, I have no doubt, made provision for overflows from the existing system entering them. This work was not authorized by the Provincial Board of Health who were not consulted on any manner at this time. The debenture issued was validated by a bill of the legislature—Chapter 58 of the Statutes of Ontario, 1915, 5 George V.

Application was made to Mr. Ashplant, the city engineer, under date of April 2nd, 1914, for copies of the surveys in connection with this matter, but although the letter was acknowledged on April 3rd, nothing was done in the matter and to this date no plans have been furnished to the Board.

There appears to be no good reason why a portion of this money could not have been devoted to the purpose of constructing an additional syphon instead of spending as much as \$216,000 on the storm sewer system, which is the expenditure to date.

Under date of July 14th, 1915, Dr. Hill wrote inquiring as to the Board's attitude in respect to the use of septic tanks draining directly to the river in some of the areas inaccessible by gravity to the city sewerage system, which letter was answered July 20th. At a later date, February 9th, 1916, Dr. Hill again wrote, mentioning the fact that there were some 2,800 outside toilets in London, of which approximately 90 per cent. could be connected with the existing sewers, the other portion being in areas difficult to remedy.

In response to this letter and, upon request of Dr. Hill for investigation of certain nuisances by reason of which raw sewage was emptying into the river above and in the middle of the city, a visit was made on May 17th to the City of London to examine into the matter. All of the nuisances examined, a list of which is attached hereto, while doubtless being infringements on the clause respecting pollution of streams, appeared of minor importance when compared with the glaring neglect of the city authorities in respect to their own sewage, 70 per cent.

of which (according to Mr. Chipman's report and further confirmed by our own observation) enters the river raw and untreated within the limits of the municipality, no attempt being made to carry the sewage to the disposal works.

In reference to the matter of abolishing outside privies and connecting the existing sewers, the city should need no instruction from this Board, as sub-section 2 of Section 25 of the Public Health Act adequately covers the matter. A by-law should be passed condemning the existence of outdoor privies where premises could connect to sewers, and reciting the same as nuisances, in order to proceed legally under the Act. For your information I may say that I learned with considerable astonishment that although there were in existence at least 2,800 outside toilets, with the possibility of there being 4,000, no effort had as yet been made to enforce screening or to systematize the removal of night soil, the matter being left entirely to the householder. A yearly inspection by a force selected at random once a year for that purpose is made during the months of May or June. It is presumed that such a force would not have any proper instruction as to what to condemn in the way of inadequate or improperly constructed conveniences. There appears to be no good reason why this matter could not be carefully supervised either under the Street Cleaning Department or under the Local Board of Health, in view of the somewhat under-staffing of the municipal officers.

In summing up the situation, I am of the opinion that the municipality has been grossly negligent in regard to their own sewage disposal, that the storm system has proved inadequate to prevent flooding of the 20-inch syphon, that the city is by-passing large portions of their sanitary sewage, and that the abolishing of outdoor toilets should be proceeded with at once and be under the supervision of a plumbing inspector having powers under a proper by-law with reference to the installation of sanitary conveniences to replace the ones abolished, and that the use of outdoor flush toilets connected with sewers be abolished on account of their extreme wastefulness in reference to water consumption.

The matter of making the proper surveys to determine the existence and location of privy vaults is rightly one within the jurisdiction of the Local Medical Officer of Health, and should be undertaken by his department. The preparation of a report upon the affording of sewage facilities to low-lying districts comes properly within the province of the city engineer's department, and should be authorized by council upon proper recommendation of the Medical Officer of Health.

A continuance of the present method of discharging from 3,000,000 to 5,000,000 gallons daily in the Thames River some sixty miles above Chatham is not to be recommended. It appears advisable that London should at least make an effort to convey its sewage to the sewage disposal area and proceed with studies to determine the most economical method of removing the solids and to partially disinfect the sewage.

All of which is respectfully submitted.

F. A. DALLYN,

Provincial Sanitary Engineer.

May 25th, 1916.

LONDON, May 10th, 1916.

To the Medical Officer of Health, City.

DEAR SIR,—The following are sewer outlets into the river:
Spettigue Rendering Works.
McClary's, south-east foundry. Across the river. Chelsea Green.
Wellington Street, south side.
Wellington Street, north side.
South Street, at river.
Richmond Street, south end.
Hydro into mill race.
Ridout Street, south side.
Horton Street, rear gas house.
York Street, bridge, both sides of river.
King Street, bridge, overflow they say.
Dundas Street, under water.
Blackfriars, bridge, overflow.
Carling's Creek, Hyman's Tannery.
Carling's Brewery into river.

Respectfully,

Sgd. JAMES LUTMAN,

Sanitary Inspector.

RE LINDSAY WATER SUPPLY.

TORONTO, October 24th, 1916.

Dr. J. W. S. McCullough, Chief Officer of Health, Ontario, Toronto.

SIR,—I have the honour to report that on July 24th I visited the Town of Lindsay at the request of Dr. McAlpine, Medical Officer of Health, for the purpose of advising him upon certain drainage problems in the neighbourhood of the Dominion Arsenal. While at Lindsay I had the opportunity of examining the town's water purification plant.

The water consumption of the town is now such that approximately 650,000 gallons are pumped during the day as the yearly average, and it is expected that the Dominion Arsenal will create a further demand of at least 200,000 gallons per day. The ozone apparatus as designed by Mr. Bridge, according to Dr. Naismith's report, was intended to treat about 500,000 gallons as a maximum.

The present filters which have been constructed from time to time by the town are of local design and are operated without the use of alum. I regret to report that the whole plant requires rather extensive remodelling. The operation of the ozonizing apparatus does not appear to have been materially changed since Dr. Naismith made his report. The pump attendant further informed me that *owing to defects in the ozonizers they are operated intermittently*, whereas, the water consumption necessitates the pumps being operated continuously.

Furthermore, analyses made from time to time over the past two years show the water (not only at the source of supply, but frequently also at taps located in

various parts of the town) to be seriously contaminated, and it may be accepted as a fact that no matter what ozonization may do for water in theory, the efficiency of the apparatus at Lindsay in removal of bacterial organisms, appears to be almost nil.

Considerable trouble also arises when back-washing the filters. This is due to the fact that the variations in the level of the Scugog River necessitate the wash water troughs being kept six to seven feet above the filter media, which makes it almost impossible to remove the mud in suspension. Good filter design places the height of the wash water troughs from 18 to 22 inches above the sand.

The Fire Underwriters are asking for further pumping units to be installed and I am informed that the Hydro-Electric Commission have been requested to make some suggestions along that line. The existing pumping station is very much crowded and any additional units will, in all probability, be separately housed.

The revenue of the town waterworks over and above all operating expenses and repayment of the existing debentures was shown to be \$7,229.28 in 1914. It appears from this that an expenditure on capital account for improvements to plant amounting to as much as \$100,000 could be made without altering the existing water rates. It is a question of doubtful policy to permit water companies to serve as revenue producers for the municipality at large at the expense both of public health and adequate fire protection.

From conversation with the town authorities, the Medical Officer of Health and the members of the engineering staff of the Hydro-Electric Commission, it appears that the consensus of opinion is that considerable changes should be made in the immediate future to the pumping station and the purification plant. Naturally the ozone plant is a bone of contention. *There is no question that with the existing arrangements the plant is of practically no use and as far as I can see performs no useful function.*

It is possible that by changing the position of the aspirators the existing plant can be put to considerable service, and incidentally by drawing air continuously through the ozonizers it is possible that they may work without over heating, as is now the case. I believe the most advantageous arrangement would be to put in a set of low lift pumps with a batch of pressure filters to be nominally operated by the low lift pumps, but built of such strength and so cross connected that they can be used in series with the service pumps. The recently constructed gravity mechanical filter could then be used as a sedimentation tank and such portion of the sand in the existing chambers as is of suitable quality could be used for filling the pressure filters. A new building would be required to house the pressure filters and could be so arranged as to provide for filter extensions in one wing and pump house extensions in another, the building being shaped like an "L" with the first battery of filter units placed in the corner.

Excluding cost of the pumps, a suitable building and the filters for the present capacity of one million gallons, capable of being overloaded to give a total yield of one and one-half million gallons, would not cost more than \$15,000. Advantage would be taken of the ozone plant. The operation would be in the following manner: The water from the river would flow to the sedimentation basin, receiving as it enters the basin a small dosage of alum. After passing the basin the water enters a pump well and is then forced by the low lift pumps through the pressure filters and thence to a small storage tank controlling the flow through the aspirators. The aspirators in this instance would be of the design used at Baltimore and so placed that the warm air from the ozonizers will have no diffi-

culty in being drawn to the tubes, as is now the case. The water after passing the ozonizers flows down through the ozonizing water and would rise in the existing pump well to a greater height than is now the case. From the pump well the water will be delivered by service pumps to the town under suitable pressure.

The new filter building could be arranged to house new electrical pumping equipment and permit utilization of the existing steam plant as a standby generating station to offset peak load conditions.

Whether or not the proposed changes are carried out I am of the opinion that chlorination should be required for the water supply of the Town of Lindsay until such time as the purification methods can be shown to be adequate by bacteriological tests.

All of which is respectfully submitted.

F. A. DALLYN,
Provincial Sanitary Engineer.

RE LINDSAY WATER SUPPLY.

TORONTO, October 31st, 1916.

Dr. J. W. S. McCullough, Chief Officer of Health, Ontario, Toronto.

SIR,—I beg to report that acting under your instructions, a visit was made at Baltimore, Md., in company with two officials from the Town of Lindsay, Mr. Davidson of the Hydro-Electric Commission and Mr. DeLaporte of the Experimental Station, for the purpose of enquiring into the operation of the ozone plant under the management of the Baltimore County Water and Electric Company.

This Company, at the Herring Run plant, is treating from three to four million gallons of water per twenty-four hours, and their works are of considerable magnitude. The water is taken from the river some distance above the municipality to be served, and is stored in a reservoir having a capacity of approximately eighty-five million gallons. The depth of water in the reservoir varies from 10 feet to 20 feet. The water, as it leaves this reservoir, is treated by the ozone process and is then elevated to an open reservoir, having a twelve million gallon storage capacity. Their chemist, Mr. Sheppard T. Powell, stated that in the raw water colon bacilli were normally present in 1-10 cc., that after storage they were only present in 1cc., and after treatment only in 10 cc.; the bacterial counts being reduced from 6,000 in the raw to 400 after storage and 70 after treatment; (the bacterial counts were made on agar agar 37 degrees incubation).

The ozonizers and the aspirators used in this plant are of local design, having it is understood, been designed by Mr. A. E. Walden and Mr. S. T. Powell, the former of whom has applied for patents. The particular feature of the ozonizers is the use of micanite dielectrics and the convenient manner of replacing them. The aspirators are of cast iron with an enamel finish to protect against corrosion.

Considerable tile pipe is used about the plant for conveying the ozonized air to the aspirators.

It has been found convenient to use low lift pumps to obtain a velocity through the aspirators which is done by elevating the water to a storage tank and arranging the aspirators to work under a two foot head.

The aspirators are arranged in batteries, permitting extra dosing as well as making possible replacing of units either out of service or being repaired.

The ozonized air was said to contain from .6 to 2 grams of ozone per cubic metre, the normal operation being with ozonized air containing two grams per cubic metre. No devices had been placed to determine what volume of ozonized air was being received at the aspirators.

The application of ozone was measured by current consumption and the number of ozonizers in service. It was estimated that about $\frac{1}{4}$ of a cubic metre of ozonized air was received at the aspirators for each cubic metre of water.

The engineer reported that \$2.00 covered the cost of treating each million gallons with an electrical charge of \$3.00 per month per kilowatt of demand. Two hundred and ten kilowatts was apparently being used to run the entire plant treating from three to four million gallons.

The plant consisted of rotary convertors, a low lift pump delivering 4,200 gallons per minute with a total lift of 8 feet (pump and motor 400 R.P.M.) and the ozonizers. The pumpage of water from the storage reservoir to the overhead tank was controlled by an automatic Butterfly valve, the pump was operated for continuous duty.

The large open reservoir gave rise to considerable algal growth, which was removed or treated periodically sometimes as often as twice a week with four to five pounds of copper sulphate, according to the figures of the chemist, Mr. Powell. The copper sulphate was dissolved in the usual manner by placing in a bag and drawing it through the water by means of a row boat.

The water after treatment is not as clear as filtered water although little or no complaint is made of its character.

The cost given for the treatment at Baltimore does not include capital charges on the storage reservoir so that the cost of \$2.00 is practically a direct charge. Mechanical filtration of the water at a cost of from three to four and one-half dollars will effect equally good results as far as the removal of organisms is concerned. It will also remove colour and clarify the water, the clarification being a distinct advantage over the ozone process. Mr. Powell's claim that a removal of organisms of over 90 per cent. is effected by the ozonization, I believe, can be substantiated and his further claim that the taste of the water occasioned by algal growth both in the river and in the storage basin, is materially improved by the process, I believe, can also be shown. Ozonization elsewhere should not be called upon to make more than 90 to 95 per cent. removal of organisms with some improvement in the colour and taste of the water. Destruction of organic life by the ozone process is unquestionable, but I do not think this is a serious problem at Lindsay. In view of the fact that the water is now used with little or no objection, I have, therefore, not discussed it.

The use of ozone for the Town of Lindsay appears to be without advantage. From my own observations I should say that the use of alum with mechanical filters of improved type would give them much superior results than can be obtained by the use of prefilters without alum but followed by the ozone treatment. The cost is approximately the same either way. However, if the existing ozone plant at Lindsay is to be continued I would recommend that a type of aspirators such as used at Baltimore, be adopted and that the aspirators be placed so that the suction will be sufficient to draw air from the ozonizers. As will be seen in the report on Lindsay supply the present arrangements do not permit this. I would say that the ozonization at Baltimore has proved a success, but that natural advantages such as the storage of the water have materially helped toward this end.

Through the courtesy of the Engineer, Mr. A. E. Walden, the party was able to see a good deal of Baltimore City and Baltimore County, and to visit another of their water purification plants at which the water was treated by a rapid sand filter plant of modern construction. Too much cannot be said of the courtesy of Mr. Walden and the Chemist, Mr. Powell, who did all in their power to make the visit both entertaining and profitable.

All of which is respectfully submitted.

F. A. DALLYN,
Provincial Sanitary Engineer.

RE KITCHENER WATER SUPPLY.

TORONTO, October 30th, 1916.

Dr. J. W. S. McCullough, Chief Officer of Health, Ontario, Toronto, Ont.

SIR,—I have the honour to report that upon request of the Local Board of Health of the City of Kitchener an examination was made of the source of the water supply, for the purpose of enquiring into some slight pollution shown to exist in the tap water from time to time.

The main portion of the water supply for Kitchener is obtained from a series of artesian wells. The wells, with the exception of one 7-inch, have been driven, using 8-inch casing. The depth varies from 197 to 113 feet, with one deep well 280 feet. Each well is pumped individually by an equipment composed of a small electric motor and centrifugal pump. The water is conveyed to a large storage reservoir (1,500,000 capacity) situated behind the pumping station, from whence it is delivered to the town mains and elevated tank under pressure of from 75 to 80 pounds.

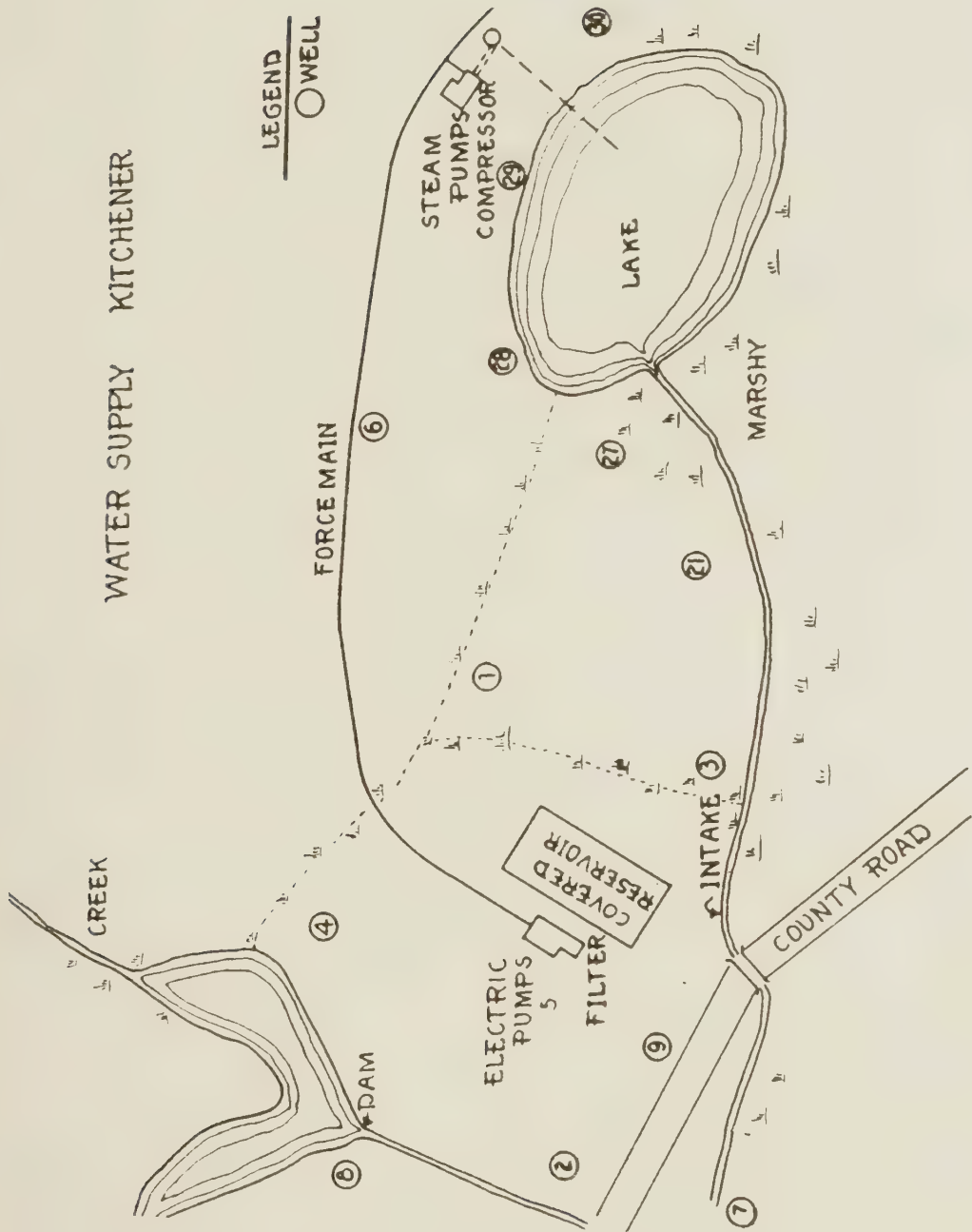
In addition there are several wells at the Glasgow Street pumping station which are driven 360 feet with 8-inch castings, and known to be pure though of extreme hardness.

A mechanical filter was installed at the main pumping station in 1908 having a capacity of 500,000 gallons per 24 hours.

When the filter is in service the Spring Creek arising south or south-west of the pumping station is utilized and feeds the filter after passing through the waterworks pond. The suction for the low lift pump operating the filter is placed in a depression of the overflow creek from the waterworks pond and is protected by some temporary screens of a primitive character.

No precaution appears to have been taken to protect the water supply to the mechanical filter. In the first instance the fences protecting the spring creek area have been neglected and a great many cattle now wander in the valley, polluting the creek to a very considerable degree. This is a matter which should be remedied at once by the repair or replacal of the existing fence, and adjacent property owners should be warned against any destruction of the fences in order to allow their cattle to invade the wet lands.

Records of the well borings made by the late Mr. Bowman show that layers of black soil, gravel, clay, hardpan, sand, clay and sand, quick sand and gravel were encountered. These records are quite complete. From the fact that the gravel



is found irregularly between the surface and the level from which water is drawn, some connection doubtless exists between the surface in the vicinity of the wells and the wells themselves. This is also borne out by the fact that the water of the waterworks lake is of the same character as that from the wells.

KITCHENER WATER SUPPLY.

Dionic Water Tester:		Conductivity 10° C.
Well No.		Dionic Water Tester.
1.....		310
2.....		280
4.....		300
5.....		300
7.....		350
Rock well No. 9.....		800
23.....		325
27.....		325
28.....		310
29.....		350
30.....		340
W. W. Lake P. H.		350
Overflow of lake at intake		350
Spring Creek		375
Rain water in barrel		30

Bearing this in mind it is but a reasonable precaution to keep the pond and the areas surrounding the wells as sanitary as possible. This has not been done. Cattle have been allowed to wander without restraint in the spring creek supply which has been by-passed through the pond for considerable periods. Also the overflow from the pond has been so poorly provided for that the surface of the ground in the neighbourhood of many of the wells is wet and soggy with many discoloured pools filled with decayed vegetation and frogs.

There is no sufficient reason why the drainage from the waterworks pond cannot be confined to one channel or even to a closed conduit through the area in which the wells are placed, and that all surface water be drained thereto.

I would recommend for the protection of the mechanical filter that a direct connection be had to the waterworks pond and a direct connection to the spring creek, the dams at the spring creek being raised to permit of further storage which would materially assist in both the operation of the filter and in the removal of harmful organisms. Should the Water Commissioners take no action on the above recommendation I am of the opinion that the fencing of the spring creek should be ordered by the Board.

All of which is respectfully submitted.

F. A. DALLYN,
Provincial Sanitary Engineer.

TORONTO, July 22nd, 1916.

RE CAMP PETEWAHA SEWAGE DISPOSAL.

Dr. J. W. S. McCullough, Chief Officer of Health, Toronto, Ont.

SIR,—I have the honour to report upon the marginally noted subject as follows:

Sewage from Camp Petewawa to the extent of from 60,000 to 80,000 gallons per twenty-four hours is discharged after treatment, into the Ottawa River some

ten miles above the Town of Pembroke. Bacteriological examinations made of the Ottawa River water in the vicinity of Pembroke water supply intake, above the same and below Petewawa, indicate that the river is polluted as shown by the repeated presence of *B. Coli* in the water examined. (*B. Coli is an intestinal organism proper alike to the intestinal track of both man and animal and usually present on pasture lands or fields which have been enriched with barnyard manure.*)

The local authorities have been treating their water supply with hypochloride of lime since 1909, the treatment at that date was resorted to owing to a severe outbreak of typhoid. In addition to the treatment of their water the town has been at considerable expense by reason of moving their intake to a more favourable position above the town. This was primarily for the purpose of getting out of the influence of the back-eddy sweeping up the shore past the town and which carried considerable quantities of Pembroke sewage. Since improving the water supply the local authorities quite naturally look with displeasure upon the discharge of sewage above their intake from the military camp.

Unfortunately there have been occasions when the sewage from the camp has been indifferently looked after. In my opinion the town with the existing protection of its water supply has no occasion to apprehend trouble from the sewage of Camp Petewawa were the Camp treatment adequate. Unfortunately the excellent arrangements for treating sewage at the Camp have not been as effectual as operations of similar apparatus in other localities would lead one to hope for.

ANALYSIS OF CAMP PETEWAWA TREATED SEWAGE.

No.	Location of Sample.	Total Solids	Oxygen Consumed.	Nitrogen.				Chlorine as Chlorides.
				Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.	
1	Septic Tank Overflow	234	16	16.7	4.3	None.	.15	40
2	Intermittent Sand-filter Effluent	314	10	15.0	2.8	"	.24	57
3	Ottawa River	46	6	1.7	2.6	"	.25	....

Sample No. 2 shows 95% stability.

The attached analysis shows very little change in the sewage from when it leaves the tanks to when it leaves the drains of the filter beds. The filters should give about 70 to 80 per cent. purification. It would appear that the trouble has been twofold; (1) the tanks were asked to receive the excreta collected from the latrines until a very recent date, which is a duty for which they were not designed. The present method of handling the excreta using shallow trenches and chloride of lime and burying is most effectual and should be continued. (2) The intermittent sand beds owing to the extreme high water of the Ottawa River have been constructed too shallow, and as a consequence the coarse sand now used permits the sewage to flow directly with little more than a coarse screening, to the underdrains.

This is a matter which can be materially improved by deepening the beds, and I would suggest that from 18 inches to 2 feet of sand be taken from the adjacent banks and placed in the existing beds, elevating the feed troughs, and then continue the operation as at present without the use of chlorine as is now practised. The sludge collecting in the tanks should be removed at least yearly, preferably in the spring, and pumped to underdrained sludge beds adjacent to the tanks. These

should be constructed in an approved fashion and so placed that the drainage water will either enter upon the existing sand beds or be lost through absorption in the sand before entering the river.

All of which is respectfully submitted.

Yours very truly,

F. A. DALLYN,
Provincial Sanitary Engineer.

REPORT UPON PROPOSED WATER SUPPLY FOR SAULT STE. MARIE FROM CLEAR
WATER CREEK.

From the Provincial Sanitary Engineer to the Chief Officer of Health for Ontario.

SIR,—I have the honour to report having made a survey of the conditions affecting the proposed Clear Water Creek source of supply, a visit to the site having been made on May 10th, 1916, in company with Dr. McCaig, the Medical Officer of Health, Mr. Pickering, Engineer to the Water Commission, and Dr. George, District Officer of Health.

The rate-of-flow measurements in the possession of Mr. Pickering and of which perusal was had during the visit, would indicate that for the period under observation, the past twelve months, the discharge of the springs had at no time been less than eight million U.S. gallons per twenty-four hours. Granting that this year's records may not depict conditions during a dry season, I am of the opinion that the Council would be well advised in accepting the springs as a source of water supply, upon the recommendation of their Engineer, Mr. Pickering, having in mind a reduction of the present water waste.

The water from the springs is clear and sparkling, and from chemical analysis made in our Laboratory at No. 5 Queen's Park, appears to be of excellent quality.

Be the source of the water what it may, there should be no difficulty whatever in properly protecting the springs against surface pollution in their vicinity either from stock grazing on the hills or from mischievous persons camping thereon. The loss of colour between the Root River and the springs gives assurance of sufficient storage to protect against disease producing organisms introduced by the Root River.

This water should not require any treatment by disinfecting agent, provided the springs and storage reservoirs be adequately protected.

It is recommended that sufficient property be acquired so that a distance of 100 feet be had back from the brow of the ravines directly draining into the stream, and having in view this protection it is recommended that surveys be made to determine what properties will require to be acquired.

The property should be fenced in a suitable manner and placards placed at conspicuous points advising against trespassing and stating the reason thereof.

It is further advised that the engineer be instructed to proceed with the drafting of a carefully worded plumbing by-law for the purpose of eliminating unnecessary waste from leaky house fixtures and faulty plumbing, and that a duly qualified plumbing inspector give full time to the work of such a department. Where it is necessary to remodel plumbing, especially in connection with out-door toilets, of which a considerable number have been permitted, sub-section 2, sec. 25.

of the Public Health Act should be taken advantage of in order that the cost of installing the necessary conveniences be made easy as possible to those who, to a certain extent will be put to expense in protecting against a water shortage of the municipality.

It is also suggested that the practice of installing meters be continued with the ultimate intention of metering all services. The cost of meters can be paid for by debentures as is the practice with several municipalities, and spread over a period of not less than ten years.

With reference to the continuance of the existing pumping station, provided that the project of using Clear Water Creek be carried out, I am very loath to advise it. Practically all the severe epidemics in Sault Ste. Marie have come from the water supply, in the first instance being due to gross negligence in the location of the intake in the ship canal, and latterly due either to interruptions in the administration of bleaching powder or from intensive pollution from boats, for which the dosage of chlorine is inadequate, the last being very hard to either control or foresee.

Could all sewage, due either to outdoor privies or workmen about the river above the steel works and the entire sanitary sewage of the steel works and paper mill be carried either by gravity or by a pumping force main below the locks, the water coming from the power canal during the winter months should present no serious menace.

As far as the boat pollution is concerned the recent experience of the city and its past history of typhoid needs no further comment of mine.

Generally speaking the condition of this water could be controlled when used for emergency purposes, provided the dosage of bleaching powder was sufficiently high and available when required: but to my knowledge there is no apparatus now in the market for this purpose, which an engineer would be justified in recommending on sanitary grounds. The whole dependence will be on the operator at this auxiliary plant, and he may be sick when wanted most; the town is then forced to rely upon some local stationary engineer whose knowledge of sanitation may be of no value whatever.

While not entirely dismissing the project of maintaining an auxiliary intake, *I believe it would be advisable to consider it only as a last expedient, and would suggest that an effort be made by the construction of a duplicate pressure main and large storage reservoir, together with a curtailment of water waste, to provide all water required during any heavy draft for fire purposes.*

I am of the opinion that any appropriation passed for acquiring land and proceeding with the pipe line should also include an appropriation for exploration work under the direction of your engineer, to determine something of the nature of the strata underlying the catchment area, and to show what utilization could be made of the existing ravines either on the property of Mr. Ben. R. McMullen as shown on Mr. Pickering's sketch map or the property adjacent damming the lower reaches of the springs, for this purpose if need be. This would decrease to a large extent the amount of sediment in the water conveyed to the reservoirs which, in my opinion, is due largely to the high velocities existing in the creek on account of its rapid fall.

The creek now finding its way in from the Johnston property just north of where the intake location is proposed might be diverted, at no great expense, to Silver Creek, and an earthen dam with clay core wall constructed between the property and Cold Water Creek.

The fluctuating flow in Root River, which lies to the north of the existing

springs and the bed of which is higher than the ground water level in its vicinity was called to by attention. The river undoubtedly loses a great deal of water through this portion of its route, but it is problematical whether the loss of water only takes place at this point and flows to the springs. I am rather of the opinion that if surveys were made it would be found that the ground water in the path of the Root River is considerably lower than the river bed and that water is lost over a considerably larger area than the gravel pit. It is, however, possible to determine this by survey, and also to determine whether the gravel stratum feeding the springs extends to and forms part of the area fed by the river immediately north of the source of the westerly branch.

All of which is respectfully submitted.

F. A. DALLYN,
Provincial Sanitary Engineer.

May 18th, 1916.

REPORT UPON THE WATER SUPPLY AND SANITATION AT ROCKLAND, ONTARIO.

Rockland is a small town on the banks of the Ottawa River some twenty-seven miles by river below Ottawa. The town is largely dependent upon the Edwards Lumber Mills and upon a considerable farming community throughout the County of Prescott.

An examination was made into the water supply on May 3rd, 1916, for the purpose of determining as to whether the water supply which was installed by the Edwards Company for fire protection solely, was being used for domestic purposes. It would appear that by the original agreement it was contemplated to furnish a pure water supply, but inquiries on the part of the Company, showed this would involve the use of filters and some supervision which they were reluctant to undertake. The matter then resolved itself into providing a fire supply and the town now pays a rental of \$490.00 per annum for 49 hydrants. Since the system was installed practically the whole of the town, with the exception of East Rockland, have connected to this fire protection system and are using it for all purposes. The water unquestionably is seriously polluted as was shown in analyses made on July 9th, 1915.

There has been no effort on the part of the town or the Company to have this water periodically examined; the only samples received are those submitted on March 20th, 1913, and July 9th, 1915, respectively, upon instructions from this office.

The number of deaths from typhoid in Rockland since the installation of the system has reached a considerable figure, the rate being much higher than that existing in the other parts of the County and in Hawkesbury, which is considerably farther down the river and more remote from the Ottawa sewage. At the time of the severe epidemic of typhoid in Ottawa in 1912, Rockland experienced a severe outbreak a few weeks later, there being forty cases reported in the month of September. Undoubtedly there were more cases than these and the town received a certain immunity consequent upon the wide-spread epidemic. In 1915 the town experienced another outbreak reporting ten cases in the month of February. It is most improbable that this could have arisen from any source other than water or milk; from the character of the milk supply it seems most improbable that an

outbreak of this size could be contributed to this cause, especially in view of the fact of the constant serious pollution of the water. During this year (1916) there have been a great many cases; 11 cases were reported in the month of February alone.

Upon inquiry among the doctors in Rockland it was learned that for the years 1915 and 1916 (up to May 2nd) no less than some 57 cases have been treated in the town. This is altogether abnormal and cannot be overlooked save at considerable peril to the County, whose typhoid death rate, I believe, has been seriously influenced by the existence of this focus of infection at Rockland.

The second matter of serious moment in Rockland is the unusually high infant death rate from intestinal disorders reported in our vital statistics as Class 104, Diarrhoea and Enteritis. During the last three years, viz., 1913, 1914 and 1915, the loss in Rockland from this cause alone has amounted to 13.7 per cent., 13.1 per cent. and 17.9 per cent. respectively, of the births. Dr. Powers, the Medical Officer of Health, suggests that this may be largely due to irrational feeding of the infants by the French-Canadian mothers, as the babies, while being breast-fed and less than six months old, are given all sorts of auxiliary food. This undoubtedly is part of the trouble, but does not explain the fact that while the death rate in Rockland is so high, the average death rate in the neighboring county from this cause is only 2.87 per cent. of the births and the exceptional years only show 4.4 per cent. This, I believe, is sufficient evidence to show that supplementary feeding is not the only cause of Rockland's high infant death rate.

On the other hand we find that there is considerable congestion of the population in Rockland and that in most of the sections it must be in excess of thirty-five persons per acre. The town has offered no sewerage service whatever and the conveniences are all of the out-door privy type. Here again the town has been negligent and no effort appears to have been made towards standardizing the receptacle or supervising the screening of the conveniences to prevent flies having access to the contents thereof, during the summer months. In certain sections of the town flies are very prevalent in the summer and must cause considerable nuisance in addition to the transference of infective matter to the infants' mouths. Their infant deaths largely take place in the months of July, August and September, months when flies are most prevalent.

Financially, the town itself is in excellent condition, the Department of Agriculture reporting that in 1915 their debenture debt only amounted to \$4,614.00, which was for schools. The town, therefore, is in a position to undertake (1) purification of the water supply and the handling of same on some intelligent basis, (2) construction of certain sewers, (3) regulation of the type of outhouse to be permitted, together with the compulsory enforcement of screening and protection against the ingress of flies or the breeding of them in such premises.

During my visit there I had the pleasure of meeting the council and there appears to be an intelligent desire on their part to improve local sanitary conditions, especially by the installation of filters for the water supply and the construction of certain sewers. The Council, however, lack initiative but have, I believe, for years been largely influenced by the direction of Senator Edwards, through whose efforts the town has all the outward semblance of a prosperous centre. I have inquired into the probable cost of filters to meet with the town's present requirements and am convinced that it will not exceed \$9,000.00, including housing of the required equipment. Such an expenditure will only involve the town in an annual expenditure of about \$760.00 for interest and re-payment of principal. The construction of sewers will be considerably more costly, but owing

to the topography of the town, can be laid at a minimum of expense with the exception of certain sections which will have to be constructed in rock.

I have the honour to recommend that the Town of Rockland be urged to instal pressure filters with the addition of chlorination for protecting their water supply which undoubtedly is the main source of their typhoid, and, I am of the opinion, responsible in a secondary manner for a great deal of their diarrhoea and enteritis amongst infants. The town will undoubtedly save money by this step owing both to the lessening of typhoid and to the attractiveness of the water supply, which then can be put upon a paying basis and assessed like other local improvements. The regulation of type of outhouse is also necessary. By-laws similar to that suggested in our pamphlet on Sewage Disposal should be passed and a standard type of outhouse should be required for new premises, together with the effective screening and protecting of existing ones.

With reference to the serious pollution in the Ottawa River I beg to submit that the same is caused by sewage of the City of Ottawa and of the City of Hull. To just what extent either is responsible it would be difficult to determine. In the spring Rockland is not more than twenty-four hours by river flow from Ottawa or Hull. Consequently there is very little opportunity for storage of the sewage permitting infective organisms to disappear either by longevity or by sedimentation, the current in this section of the river being in excess of two miles per hour in many sections. In summer, with low water and a lessened stream flow the conditions are not materially improved, so that at all periods of the year adequate protection of the water will be required. By reason of the very large amount of sewer construction required before the sewage of Ottawa could be collected and treated at a central point or a series of points, and owing to the fact that we have no jurisdiction whatever over the City of Hull in Quebec, I am of the opinion that it is entirely futile to wait until such time as the pollution is corrected at its source. While it is unfortunate that from a public health standpoint, a smaller community should suffer through aggressiveness of a larger one, yet under such circumstances, the smaller one must be compelled to protect itself by an expenditure of its own moneys.

All of which is respectfully submitted.

F. A. DALLYN,
Provincial Sanitary Engineer.

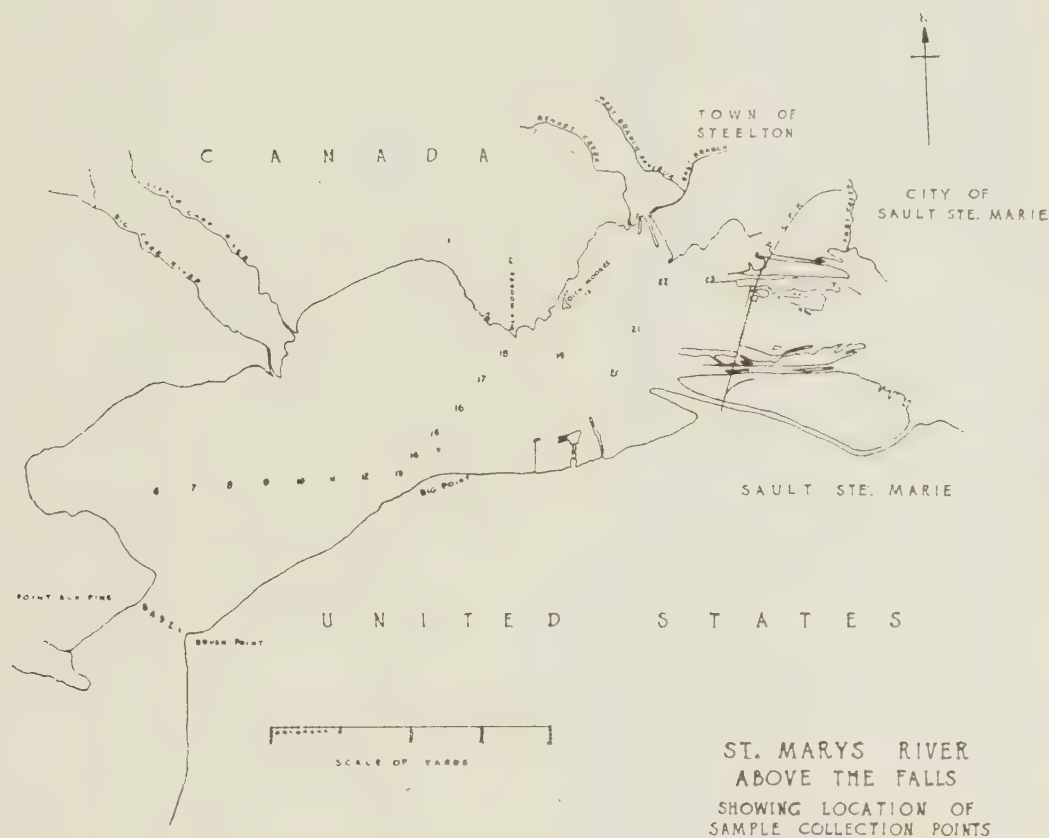
REPORT RE WATER OF UPPER ST. MARY'S RIVER.

TORONTO, October 21st, 1916.

*Dr. J. W. S. McCullough, Chief Officer of Health, Ontario, Parliament Buildings,
Toronto.*

DEAR SIR,—In accordance with your instructions I went to Sault Ste. Marie on October 9th, 1916. The City Council had appointed a committee of three aldermen—Dr. McCaig, Medical Officer of Health, and Mr. Van Every, the City Treasurer—to supervise and oversee my work. On October 17th, Dr. McCaig, Mr. Van Every, Alderman Spiers and myself went up the St. Mary's River as far as Point aux Pines. Samples were taken at the points marked in the accompanying

blue print. The day was clear and cold with a fresh northerly breeze. Fourteen vessels were passed in the river. Some of these had been storm-stayed for a couple of days. The samples taken were mostly at a depth of twenty feet. In shallow places, however, the samples were taken two feet from the bottom. The bacteriological examination of the samples was carried out, following the standard methods of the American Public Health Association.



The results were entirely in accordance with those obtained by the International Joint High Commission in 1913, and showed a dangerous and general pollution of the Upper St. Mary's River. Every sample but one showed B. Coli in 25 c.c.; 6 samples showed B. Coli in 5 c.c. and sample No. 10 showed its presence in 1 c.c. This indicates a fairly even distribution of the pollution throughout the river. This was due no doubt to the mixing by the high winds which had prevailed for several days.

Bacteriological Analysis re Water of Upper St. Mary's River.

Samples	Depth in feet.	Count 37°	Fermentation.		B. Col.	
			1 cc.	5 cc.	25 cc.	50 cc.
1	10	5	0	0	+	+
2	17	37	0	0	+	+
3	20	4	0	0	+	+
4	20	8	0	0	+	+
5	20	2	0	0	0	+
6	10	11	0	0	+	+
7	5	10	0	0	+	+
8	20	2	0	0	+	+
9	20	1,000	0	0	+	+
10	20	3	+	+	+	+
11	20	600	0	+	+	+
12	5	2	0	0	+	+
13	31	24	0	0	+	+
14	5	1,200	0	0	+	+
15	20	3,000	0	0	+	+
16	20	9	0	+	+	+
17	15	2	0	0	+	+
18	11	1,400	0	0	+	+
19	20	3	0	0	+	+
20	12	1,500	0	+	+	+
21	22	24	0	0	+	+
22	22	9	0	0	+	+
23	22	3,500	0	+	+	+

The bacteriological analysis of the samples, together with a blue print showing the location of the samples, are included herewith.
All of which is respectfully submitted.

A. V. DELAPORTE,

Chemist in charge of the Experimental Station.

REPORT RE ORILLIA WATER SUPPLY.

TORONTO, July 22nd, 1916.

Dr. J. W. S. McCullough, Chief Officer of Health, Ontario, Toronto.

SIR,—Acting on your instructions I visited Orillia on June 9th to investigate the operation and efficiency of their filter unit.

UNIT.

The unit consists of five filters 16 ft. x 8 ft. of the pressure type. The filtering media is quartz sand of an effective size of 0.428 and a uniformity co-efficient of 1.6.

OPERATION.

The filters are used about 9 hours daily, from 4.30 a.m. until 7.30 a.m., from 9.30 a.m. until 11.30 a.m., from 2 p.m. to 5 p.m. and from 8 p.m. to 9 p.m. About every third day the filters are washed, air being blown through them for five minutes, then water for eight minutes. After washing the effluent is run to

waste for about five minutes before being turned into the town mains. The quantity of alum used was one grain per gallon; one-third being added before the water enters the sedimentation tank, one-third in the pump well and the remainder in the pump itself.

RESEARCH WITH FILTERS.

After washing filter "E" the manhole cover was removed and a sample of the sand was taken for analyses. A heavy growth of algae was observed in the sand.

Bacterial examinations of the low water, the water in the pump well and the effluent from the different filters on starting, namely:

10 minutes after starting
20 minutes after starting
 $\frac{1}{2}$ hour after starting
1 hour after starting, were made.

These showed that the bacteriological efficiency of the filters was poor—50 per cent. of the organisms growing at 18 degrees, 95 per cent. of the organisms growing at 37 degrees and 90 per cent. of the B. Coli (estimated by the Phelps method) were removed during the treatment.

The result showed also that the bacterial counts at 18 degrees in the effluent from the filters was actually greater than the bacteriological counts in the influent from the pump well, and that the removal of the organisms growing at 37 degrees was only 43 per cent. and with a B. Coli removal of 87 per cent.; the remainder being the major portion of the removal having taken place in the sedimentation tank. The counts also show that the beds were infected with organisms growing at 18 degrees.

This low bacterial removal led to an investigation of the filter media. The filter was washed thoroughly and the manhole cover removed and a sample of the sand taken for mechanical analysis. A visual examination of the sand disclosed a heavy growth of algae. An analysis of the sand showed that it was of good filter size, the effective size being 0.428, the uniformity co-efficient 1.6.

Filter "D" after the removal of the sand was put in operation again and samples of the effluent and influent were taken for five minutes. These samples showed that the filter was slow in picking up its efficiency. The count in the effluent invariably being higher in the effluent than in the influent. This gave further evidence of the infection of the filters.

A mechanical examination of the raw water, the filter influent and filter effluent immediately after washing, 10 minutes after washing and 30 minutes after washing proved that the smutzdecka was slow in forming. Alum over and above that naturally in the water being present in the effluent 10 minutes after filtration had commenced. The filters mechanically seemed in good condition.

Why the efficiency of the filter was so slow seems to be due:

1st.—The slow forming of the smutzdecka primarily.

2nd.—To the distribution of the smutzdecka during the period when filters are standing.

3rd.—To the infection of the filters themselves.

From the data collected it would seem that the coagulant added was insufficient. This taken together with the operation of the units (the operation is certainly no standard practice) would lead to a distinct lowering of the efficiencies.

LABORATORY EXAMINATION ORILLIA WATER SUPPLY. JUNE 10, 1916.

CHEMICAL.

	Raw Water.	Pump Well.	Filter After Wash.	Filter "E" 10 Minutes After Wash.	Filter After 30 Minutes' Operation
Total Solids	156.0 ppm.	161.5	162.5	156.0	160.5
Losses on Ignition.....	62.0	61.0	64.5	58.0	71.0
SiO ₂ .....	.....	.....	.....	1.0	.....
SO ₃ .....	.....	9.0	7.0	5.0	7.0
CaSO ₄ .....	.....	.....	.....	.....	.....
Fe ₂ O ₃	0.5	0.5	0.5	0.5	0.5
Al ₂ O ₃	1.0	5.0	4.5	2.0	1.0
Cal.....	56.5	58.5	63.5	62.0	57.5
Cl.....	3.0	2.0	2.0	3.0	2.0
MgO	18.5	9.2	13.2	9.5	10.0
Na ₂ O	4.4	10.0	7.5	9.0	9.0
K ₂ O.....	.....	.....	0.5	1.5	.....
CO ₂	70.0	60.0	69.0	63.5	60.6
Alkalinity	128.0	120.0	126.0	117.0	115.0
Alum.....	.....	0.8	.....	0.4	0.2
		grs. per gal.		grs. per gal.	grs. per gal.

BACTERIOLOGICAL.

Water.	Source of Samples	Counts.		No. c.c. 1 cc.	B Coli.				Time.
		18°-22°	37°		5 cc.	10 cc.	25 cc.	50 cc.	
Raw.	1	52	12	+	+	+	+	+	9.58
	2	22	Spr.	+	+	+	+	+	10
	3	27sp	28sp	+	+	+	+	+	10.10
	4	28	14	+	+	+	+	+	10.40
In Pump Well.	5	1	29	+	+	+	+	+	9.50
	6	18	8	+	+	+	+	+	10.
	7	15	23	+	+	+	+	+	10.10
	8	500	560	+	+	+	+	+	10.40
Effluent Filter "A"	9	3	4	0	+	+	+	+	9.58
	10	1	10	0	0	0	+	+	10.
	11	Spr.	2	0	0	+	+	+	10.10
	12	Spr.	1	0	0	0	0	+	10.40
	13	4	0	0	0	+	+	+	11.40
Effluent Filter "B"	14	3	0	0	0	0	+	+	Do.
	15	25	2	0	0	+	+	+	
	16	0	0	0	0	+	+	+	
	17	32	5	0	0	+	+	+	
Effluent Filter "C"	18	29	1	0	0	+	+	+	Do.
	19	Spr.	1	0	0	+	+	+	
	20	Spr.	0	0	0	0	+	+	
	21	1	1	0	0	+	+	+	
"D"	22	2	0	0	0	0	+	+	Do.
	23	Spr.	0	0	0	+	+	+	
	24	1	1	0	0	0	+	+	
	25	2	1	0	0	+	+	+	
"E"	26	2	0	0	0	+	+	+	Do.
	27	2	2	+	+	+	+	+	
	28	3	1	0	0	+	+	+	
	29	4	0	0	0	+	+	+	9.50
Influent Filter "E"	30	2	1	+	+	+	+	+	On starting.
	31	Spr.	0	0	0	+	+	+	5 minutes.
	32	2	0	+	+	+	+	+	10 "
	33	1	0	0	0	+	+	+	15 "
	34	9	0	0	0	+	+	+	20 "
	35	3	1	0	0	+	+	+	25 "
Effluent Filter "F"	36	10	1	0	0	+	+	+	On starting.
	37	Spr.	Spr.	0	0	+	+	+	5 minutes.
	38	37	2	+	+	+	+	+	10 "
	39	11	1	0	0	+	+	+	15 "
	40	6	9	0	0	0	+	+	20 "
	41	14	2	0	0	+	+	+	25 "

Note.—In all cases spreaders were Agar liquefiers.

ANALYSIS OF SAND FOR FILTER "E"—ORILLIA WATERWORKS.

Sieve Marked	Size of Mesh in MM.	Quantity of Sand Passing in Grams.	% of Total	Sieve Marked.	Size of Mesh in MM.	Quantity of Sand Passing in Grams.	% of Total.
200	0.074	0.076	0.076	80	0.215	0.214	0.214
170	0.106	0.096	0.096	70	0.257	0.521	0.521
140	0.124	0.123	0.123	40	0.39	4.791	4.791
120	0.139	0.13	0.13	20	0.769	79.396	79.396
100	0.169	0.18	0.18	10	2.198	99.995	99.995

CONCLUSION.

(a) A vigorous cleaning with copper sulphate or bleaching powder would remove the algae growth and the infection in the filters.

(b) The filters should be washed every morning before being used for the day—5 to 8 minutes washing would be sufficient—air not being necessary.

After washing the filters the filtrate should be run to waste for at least 10 minutes in order to give sufficient smutzdecka for filter purposes time to form.

(c) The amount of coagulant being added is insufficient and should be nearly doubled.

The alkalinity results are appended.

All of the above is respectfully submitted.

A. V. DELAPORTE,

Chemist in Charge of Experimental Station.

REPORT ORILLIA WATER SUPPLY.

TORONTO, July 22nd, 1916.

Dr. J. W. S. McCullough, Chief Officer of Health, Ontario, Toronto.

SIR,—On July 4th I made a sanitary survey of the source of the Orillia water supply. This was deemed necessary on account of the bacteriological results obtained in the previous visit June 9th. The following interesting facts were disclosed:

(a) Slavin's Creek which empties into Lake Couchiching immediately south of the C.P.R. cattle pens contains a large quantity of sewage. The sewage in the creek amounts to about 150,000 to 200,000 gallons per day. This comes from leaks in the force main to the sewage disposal farm.

(b) Slavin's Creek flows directly over the Orillia intake pipe about four (4) hours after entering the lake.

(c) That the privies and bathing houses in Couchiching Beach Park, about 100 yards from the pump-house, have no safeguards to prevent drainage from excremental matter reaching the lake in the immediate vicinity of the intake pipe.

(d) That the water from the bathing beaches at Couchiching Beach Park flows directly over the intake pipe.

A series of tests with floats proved that the current from Slavin's Creek passes over the Orillia intake pipe four to five hours after entering the lake. The comparative freshness of this pollution renders it doubly dangerous. The Corporation of the Town of Orillia are taking steps to prevent this unnecessary pollution.

The creek should be diverted and as much as possible made to flow into Lake Simcoe, and the remainder should be treated as ordinary sewage and pumped to the disposal works. The leaks in the sewer line from the sewer pumping station to the disposal works should be repaired and further leaks guarded against. The bathing houses in Couchiching Beach Park should be removed as far as possible from the pump house, and the privies at present in those bathing houses are distinctly unsanitary and should be done away with and proper sanitary conveniences with water-tight containers installed.

All of which is respectfully submitted.

A. V. DELAPORTE,

Chemist in charge of Experimental Station.

REPORT RE SMITH'S FALLS WATER SUPPLY.

TORONTO, July 22nd, 1916.

Dr. J. W. S. McCullough, Chief Officer of Health, Ontario, Toronto.

SIR,—Acting on your instructions I made sanitary survey of the source of Smith's Falls water supply on July 20th with a view to the chlorination of the supply.

The intake pipes are laid into a flume which leads directly from a lock basin above the falls. The water, which is seriously polluted, receives its pollution from three distinct sources:

- (1) Privies located on the banks and in the boat houses.
- (2) Steamers.

(3) Sewage from the Town of Perth which is emptied into the river about 10 miles above Smith's Falls. As the current of the river is about 2 miles an hour, it is possible for this sewage to reach Smith's Falls in about 5 or 6 hours.

(a) There are at least three privies located above the falls. These privies are within 100 yds. of the intake pipe. The ground on which they are situated has been made by filling in with large rocks. The fissures between the rocks are filled with water and form a direct connection to the river, giving the drainage from the privies direct entrance to the current and to the lock basin from which the town takes its supply. Added pollution from the steamers at the coal docks, etc., must also be carried by the current directly to the intake. This is very well shown by the accompanying diagram.



(b) As shown in the diagram, steamers lying in the lock basin above the falls waiting their turn to pass through the locks, must inevitably pollute the water supply. This is very well shown by the fact that recently when a cattle boat washed ship in the basin above the locks, direct evidence was found in the water supply. As there is quite heavy passenger traffic on the Rideau River at this point such direct connection is particularly dangerous.

Bacterial examination of this water showed counts of 125 per cc at both 18 degrees centigrade and 37 degrees centigrade, and the presence of colon bacilli 1cc.

That such a condition of affairs should exist is incredible, and immediate action is necessary to forestall a water borne epidemic. Chlorination, as a temporary measure, should be resorted to without delay. To chlorinate, it will be necessary to pump the chlorine solution into the pipe line outside the pump-house. At least 20 lbs. of bleaching powder per million gallons should be used, making a total of about 50 lbs. per day.

All of which is respectfully submitted.

A. V. DELAPORTE,

Chemist in Charge of Experimental Station.

REPORT RE STRATHROY WATER SUPPLY.

TORONTO, September 21st, 1916.

Dr. J. W. S. McCullough, Chief Officer of Health, Ontario, Toronto, Canada.

SIR,—Acting under your instructions I visited the Town of Strathroy on Wednesday, September 20th and made a sanitary survey of area likely to affect the wells that they proposed to use for the water supply. The water supplying the wells flows from a layer of quick sand through which all ground water finds its outlet to the river.

The soil at Strathroy is of a light sand nature. The town is without sewers. New houses having flush closets installed use septic tanks which drain into the soil, and those who have not flush closets have the old-fashioned unprotected pit privies draining into the ground and are unsanitary in the extreme.

The wells are located about 160 feet from a row of houses having pit privies and are between them and the river. Consequently, even if a few bacterial examinations of the water should indicate the absence of intestinal organisms, a sanitary survey of the surrounding district shows that the water would be of exceedingly doubtful character.

The present water supply of Strathroy is taken from the Sydenham River. In the pond from which the water is taken masses of faeces can be seen floating about at any time. What is supposed to be a surface drain, but really constitutes a sewer taking the sewage from the Queen's Hotel and other places, empties into this pond at the foot of Frank Street within thirty feet of the intake pipe; a back eddy carries the waste material and excremental matter immediately over the intake pipe. A sample of water taken at the intake pipe was found to contain large pieces of horse droppings and small pieces of human excrement.

While it is claimed by the town authorities that this system is used only as a fire supply and is not to be used for domestic purposes, the fact is that the water is served to the guests at The Queen's Hotel from taps, and I observed at least two different people drinking the water. I also received information that the dentists used this water for washing the mouths of their patients without any treatment whatever. The several members of the Town Council stated that they had several times seen children drinking this water from the taps. Such a condition is intolerable. As most of the pollution in the stream from which the water supply is taken occurs within the sanitary jurisdiction of the Strathroy Board of Health there appears to be no excuse for this gross carelessness.

In addition to the above pollution there are closets emptying into the river together with two or three town drains above the intake pipe. Upon being informed of this fact Dr. McAllister defended his refusal to take any action by the question, "Why should Strathroy be obliged to take action when other municipalities were allowed to drain their sewage into provincial waters?"

The Mayor, Mr. Graham, Mr. Smithrim, Chairman of the Water Commission, and other members of the Council were quite favourable to the improvement of the water supply, and in my opinion the time is ripe for Strathroy to instal a proper water plant, together with sewers and sewage disposal works.

In the meantime chlorination of this supply which is so carelessly supervised is imperative. The Medical Officer of Health should notify citizens who use this water of its most dangerous character.

All of which is respectfully submitted.

A. V. DELAPORTE,

Chemist in Charge of Experimental Station.

TORONTO, December 26th, 1916.

Dr. J. W. S. McCullough, Chief Officer of Health, Ontario, Toronto, Ont.

SIR,—Acting on your instructions I visited the police village of Westboro on December 19th in company with Dr. Moloney, District Officer of Health.

The City of Ottawa were complaining that a ditch known as the Cummings Award ditch was endangering their water supply. In addition to the question of the Ottawa water supply there was a claim of Mr. Hill to be investigated regarding the pollution of his well by his neighbour's septic tank. These two complaints are founded on the same conditions and can be very well dealt with as one.

The Cummings Award ditch is a draining scheme to carry off the surface water from part of the Township of Nepean and the Police Village of Westboro. It is simply a surface drain carrying the run-off from an area one and one-half miles long by one-half mile wide. This area includes, in addition to the Police Village of Westboro, part of the Township of Nepean. The population of the above area is about 1,500 people. As there are no sewers most of the residents have old-fashioned privies and sanitation in some parts is primitive. In other sections the residents have automatic electric pumps and flush closets, disposing of the sewage by septic tanks and tile drainage. As a consequence of the number of people on this drainage area the surface water in the Cummings Award ditch is seriously polluted and emptying, as it does, into the Ottawa River about two miles above Ottawa waterworks intake, constitutes a serious menace to the health of the City of Ottawa.

The Cummings Award ditch, however, is not the only drain emptying into the river in this vicinity. The district between Ottawa and Britannia has been subdivided into building lots and the sub-divisions have been fairly well built up. The population in this section is estimated to be 4,500 people, and numerous drains carrying surface water and, in some instances septic tank effluents, empty into the river at various points along this shore.

To handle the situation a comprehensive scheme of sewers and sewage disposal is required. Either the residents of Westboro and the adjacent sub-division will have to organize a municipality and put in proper water service, sewers, etc., or the City of Ottawa will be obliged, for its own protection, to annex the district and run a trunk sewer along the river to collect all the drainage.

The investigation into the pollution of Mr. Hill's well showed a most serious condition to exist. The sub-division of Highland Park in which Mr. Hill lives is built up with houses costing \$3,500 and upwards, and is sub-divided into lots 60 ft. x 100 ft., although in most instances the frontage is two or more lots. The only drainage in this section is by farm tile drains leading to the river. These drains are supposed to carry only surface water but connections are had to nearly all the cellars, some wash tubs and, in one case at least, the over-flow from a septic tank. If thorough investigation were carried out it would probably be found that flush closets also are connected.

The residents in the sub-division get their water from wells on their own lots and dispose of their sewage on the same lot, usually by septic tanks and tile drains. The few who have not installed flush closets generally use old-fashioned privies. As a result of this condition the ground water is heavily charged with sewage and it will be a matter of surprise to me if any well in this district is free from contamination. No bacterial results were obtainable for the wells in this district and it was impossible to ascertain the prevalence and extent of the pollution, but the situation is extremely grave.

Active measures should be taken at once to secure pure water and proper sewage disposal for this section.

In regard to the pollution of Mr. Hill's well, he maintains a privy which is certainly not water-tight within twenty feet of his well, and cannot very well put the entire blame on his neighbours. Further, as there are three septic tanks within 100 feet of his well it is impossible to blame any particular tank for the pollution, but in my opinion the removal of any or all of the tanks in this block would not render Mr. Hill's well safe for drinking.

The time is ripe for a main drainage scheme and water services for that section of country lying between the City of Ottawa and Britannia. The population of this section totals over 10,000 people. The surface drainage reaching the river from this section is undoubtedly heavily polluted and it would be absurd to take steps to remedy the pollution from one ditch and permit others as bad if not worse to continue to empty their filth into the river. If the residents of this sub-division will not organize and solve the problem themselves, the Municipality of the City of Ottawa will be forced, for its own protection, to annex the district and handle the situation as outlined.

All of which is respectfully submitted.

A. V. DELAPORTE,
Acting Provincial Sanitary Engineer.

REPORT OWEN SOUND WATER SUPPLY.

TORONTO, May 22nd, 1916.

Dr. J. W. S. McCullough, Chief Officer of Health, Ontario.

SIR,—Acting under your instructions I went to Owen Sound on Tuesday evening, May 16th, and spent the following two days investigating the condition of the local water supply. There have been 28 cases of typhoid, 9 cases of paratyphoid and 3 deaths reported in the last month. After investigating and in conference with Dr. A. B. Rutherford, Medical Officer of Health, as to the cause of the recent epidemic it was decided:

1. That the epidemic was not preceded by an outbreak of diarrhoea.
2. That in all probability the so-called paratyphoid and typhoid were from the same source. All the cases being either paratyphoid or typhoid.
3. That the epidemic had been caused by the casual pollution of the springs which formed the original source of supply for the Town of Owen Sound.

It was shown that the milk supply was not the cause of the epidemic as no one dairy had been the source of supply for all the cases. Every dairy in town had typhoid cases amongst its customers.

Another fact that made the springs the subject of suspicion was, that, while there are two distinct water systems in the town from entirely different sources, all the cases were in that part of the town served by the spring water system, or employed in that part of the town during the day.

A bacterial examination of the different waters used in the town located the trouble in the spring known as the Creamery Hill Spring.

SOURCES OF WATER SUPPLY.

Owen Sound has two distinct water systems—the low pressure system which was the original source of water supply for the town is supplied from four distinct springs. The water flows by gravity to a reservoir near the top of the “East” hill. This supply is for the main part of the town. Spring No. 1, or “Creamery Hill” spring rises at the side of Creamery Hill road; its flow being approximately 200,000 gallons per diem. It was the original source of water supply for Owen Sound. The purity of this spring being questioned twenty or more years ago the presence of drainage water in it was proven by adding phenyl to various pools in the neighbourhood. The presence of phenyl in the town water supply proved conclusively that surface water was finding its way into the spring. Steps were taken to prevent this pollution by digging an expensive drain, but at the time of my visit it was quite evident to even the most casual observer that a small stream which serves as a surface drain for some parts of the country was finding its way through fissures in the rock into the spring and must have added considerable to its volume. It is probably here that the pollution which was the cause of the epidemic occurred, although there is no record of sickness in the surrounding country. Creamery Hill road is well travelled and the stream acts as a drain for some miles. A chance traveller may have been the cause of the trouble. There was a death, in the latter part of March, from typhoid. The man was a butcher and buyer of cattle travelling extensively around the country and had been sick for some weeks before his case was diagnosed as typhoid—and he probably used this road continuously. A bacterial examination showed the spring to be positive in 25 c.c. the streams in 5 c.c. Owing to the character of the rock it would be difficult if not impossible to safeguard this spring. It would, therefore be safest in my opinion to cut this spring off from the water supply permanently.

Springs Nos. 2, 3 and 4 rise in a ravine near Ingles Falls. These are supposed to have their source in Sydenham River above the town dam. That this is the case is easily understood owing to the fissured character of the rocks, but that all the water does not come from the Sydenham River is shown by the fact that while the head of water in the river is practically constant, owing to the regulation by the dam, there is considerable variation in the flow of the springs, showing that a certain amount of the water is finding its way to the springs, and while they seemed to be perfectly pure at the time of my visit the fact of surface water being present will necessitate a constant bacteriological supervision of the water from these sources.

The water in the high pressure system is secured from the Sydenham River above Ingles Falls. Here the town has erected a dam to keep the water level constant. The water flows by gravity in a 2-foot glazed pipe (which is practically on the surface of the ground and is in rather poor condition) between a couple of cottages with their accompanying privies to two slow sand filters. Each of the filters is 160 ft. x 80 ft. and is made up of 11½ ft. of broken stone, 3 ft. of sand and operates on a head of 4 ft. The filter water flows by gravity to the high pressure reservoir about 100 yards from the old reservoir and 50 ft. or more higher. The filtered water has proven good whenever examined. There was no means of determining the rate the filter was operating at as the Venturi meters had been allowed to get out of repair, just gross carelessness. Each filter is capable of filtering 1,000,000 gallons per diem, but at the time of my visit only one filter was in operation and it was estimated to be filtering about 700,000 gallons per day. As the town uses over 1,200,000 gallons per day it would be necessary for the town if filtered water alone were used, to buy another 1,000,000 gallons of water per day from Mr. Ingles and operate both filters.

THE RESERVOIRS.

The high pressure reservoir is a concrete basin holding about 5,000,000 gallons and is well above the level of the surrounding country. This is in fine condition.

The old reservoir, however, lower down the hill should be regarded with suspicion. Above the reservoir on the hill are numerous dwellings, none of which have sewer connections and most of which have pit closets.

FIELD LABORATORY REPORTS, OWEN SOUND.

Sample No.	18°-22°c. Count per cc.	37°c. Count per cc.	Colon (presumptive test).					Current Notes.
			1 cc.	5 cc.	10 cc.	25 cc.	50 cc.	
1	400	15	0	0	.....	+	+	Sydenham River, above Falls.
2	1	0	0	0	.....	0	0	Pure Water Reservoir.
3	0	0	0	0	.....	0	0	No. 2 Spring.
4	1	0	0	0	.....	0	0	No. 3 Spring.
5	0	0	0	0	.....	0	0	No. 4 Spring.
6	60	5	0	0	.....	+	+	Creamery Hill Rd., Spring No.1.
7	145	5	0	+	.....	+	+	Spring known to pollute No. 1.
8	35	0	0	0	.....	+	+	Ground water suspected of seeping into old reservoir.

A spring rises in the centre of the reservoir. As the ground water on the hill is polluted with excremental matter and the bed rock is badly fissured the spring is probably polluted from time to time. This would render the continued use of this reservoir doubtful unless precautions were taken to prevent pollution of the reservoir by this spring.

SUMMARY.

1. Epidemic caused by pollution of Creamery Hill Spring.
2. Continued use of No. 1 Creamery Hill is dangerous. It should be permanently disconnected from the supply.
3. Springs Nos. 2, 3 and 4 are apparently pure, but a constant bacteriological supervision should be maintained.

4. The filters are operating in a satisfactory manner, but the Venturi control should be repaired and kept in working order.

5. The high pressure reservoir is in good condition.

6. The low pressure reservoir should not be used until ample precautions have been taken to prevent its pollution by ground water from the hill above.

The town should exercise sanitary control under Sec. 93 of the district for one mile on each side of the Sydenham River extending from the town to a point a mile above the town dam. They should compel the use of proper water-tight containers in the closets, and proper disposal of excremental matter. At Ingles Falls where there are several houses with water systems a proper system of disposing of the waste water should be installed to prevent any waste water finding its way into the fissures of the rock and ensure its return to the river after suitable treatment.

All of the above is respectfully submitted.

A. V. DELAPORTE,

Chemist in Charge of Experimental Station.

REPORT RE NAPANEE SEWAGE DISPOSAL SYSTEM.

Dr. J. W. S. McCullough, Chief Officer of Health, Ontario, Toronto.

SIR,—In accordance with your instructions I visited the Town of Napanee on November 28th to investigate the cause of the odours from the sewage disposal system. From time to time during the past three weeks disagreeable odours have been given off from the disposal plant and the West Street sewer. The citizens have been inclined to blame the William Davies Company for this condition.

During October and shortly before the commencement of the nuisance the Davies Company commenced the operation of a cannery and discharged their waste into the sewer at the head of West Street. An inspection of the sewage disposal plant showed that while the cannery waste was responsible for bringing the nuisance to the attention of the citizens, the disposal plant itself was in sad need of supervision. The sedimentation tanks were more than half full of sludge and only one was being operated at a time. This cut the storage to approximately one-quarter of what it was designed for. The sand beds were receiving several times the quantity of sewage they were capable of handling, with the result that they were very dirty. The effluent was malodorous and highly putrescible. These conditions alone would give rise to considerable nuisance.

In addition, however, the West Street sewer which carries the waste from the Davies cannery has not sufficient grade at the upper end for the character of waste which reaches it. This upper end has been idle for a year or more, from the time the canning company closed its doors until the William Davies Company commenced operations. It is more than probable that the sewer was partially choked before the re-opening of the factory; and when the Davies Company discharged their waste containing considerable solid matter into the sewer an obstruction occurred, the beans putrified and a vile odour was the result. Cellars were flooded with this putrifying waste, in one cellar, at least three pails of beans were collected. When the head became great enough the obstruction was overcome and the whole mass, malodorous in the extreme, was washed down to the already overloaded sewage disposal plant.

To remedy the present condition and prevent a repetition, two things will be necessary:

1. To secure the periodic (minimum twice a day) flushing of the upper end of the West Street sewer. All of the heavy waste can be kept out of the sewers by the construction of a collecting tank by the Davies Company. A periodic flushing of the sewer at frequent intervals can be secured by having the overflow from this tank operate as an automatic syphon, thus flushing the sewer at frequent intervals. The Company could also divert the water from their cooling tanks into the small stream which drains the surface water from that area. Care, however, must be taken to prevent the discharge into the stream of water carrying any waste material whatever, organic or inorganic, suspended or in solution. This would help materially to lessen the overload upon the disposal plant.

2. To put the sedimentation tanks in good working order and operate them more carefully. The sedimentation tanks should have all the sludge pumped out. In future the sludge should be pumped at frequent and regular intervals. Both tanks should be operated continuously.

(b) Clean the sand beds and keep them clean. To efficiently handle the quantity of sewage now discharged on the sand beds will necessitate very careful operation of the beds. They should be thoroughly cleaned immediately and operated intermittently; they should be cleaned carefully after each rest before being put into operation again. It may be found necessary to reconstruct the beds and convert them either into contact beds or sprinkling filters; the method of operation would then depend on the system adopted.

All of which is respectfully submitted.

A. V. DELAPORTE,

Acting Provincial Sanitary Engineer.

December 6th, 1916.

REPORT SOURCE OF INGERSOLL WATER SUPPLY.

TORONTO, August 14th, 1916.

Dr. J. W. S. McCullough, Chief Officer of Health, Ontario, Toronto.

SIR,—Acting on your instructions I made a sanitary survey of the source of the Ingersoll water supply on July 27th in company with Dr. F. D. Canfield, the Local Medical Officer of Health, and again on August 10th in company with Mr. Hall and Mr. Gafer, the engineer and chairman, respectively, of the Ingersoll Water, Light and Power Commission.

The source of the Ingersoll water supply is secured from springs which rise in a low marsh area. The marsh contains approximately 600 acres, but the town controls only 200 acres. Cattle are pastured on the remaining 400 acres and at places have watering holes in the springs leading into the town supply. It is, therefore, not surprising that the bacterial examination of the water should show the presence of large numbers of intestinal organisms, and that at times of storms the town water supply should be coloured a deep amber hue. This condition, however, while unpleasant is not as serious as that disclosed by the presence of drains from neighbouring farms leading into the water supply. Samples of two of these gave the following results:

18°c	37°c	Number of B. Coli	Drain
210	700	100	Rice.
20	12	10	Robinson.

Robinson has a water supply in his house and disposes of the waste water in a cesspool. This is situated within 300 ft. of the collecting drain which leads into the town water supply. It constitutes an almost direct connection with the town supply.

In addition to the pollution from the source already mentioned the springs themselves as shown by bacterial examination are seriously polluted. As the source of the springs are not known it was impossible to trace the springs and locate the cause of the pollution.

A disinfection of the water supply is needed at once and chlorination should immediately be resorted to. All the drains leading into the water supply should be permanently disconnected. If possible the entire area of the marsh and its drainage area should be brought under the sanitary control of the town. The pasturing of cattle in the marsh should be prohibited, and all trespassing in the marsh on any pretext whatever should be prohibited. Proper protection should also be installed to prevent drainage from the C.P.R. tracks entering the town water supply.

BACTERIOLOGICAL RESULTS.

Location.	Sample No.	Bacterial Counts.		Fermentation B. Coli.						
		18°	37°	$\frac{1}{100}$	$\frac{1}{10}$	1cc.	5cc.	10cc.	25cc.	50cc.
Rice drain.....	1	210	700	+	+	+	+	+	+	+
Head Spring.....	2	40	30	0	+	+	+	+	+	+
Hall Spring	3	4,000	3,700	0	+	+	+	+	+	+
Drain from water hole.	4	160spr.	200	0	+	+	+	+	+	+
Fitzpatrick's Well	5	160spr.	20	0	+	+	+	+	+	+
Wilson Spring	6	29	3	0	+	+	+	+	+	+
Harris.....	7	15	10	0	0	+	+	+	+	+
Robinson's Bridge.....	8	75	8	0	0	+	+	+	+	+
Robinson's Dam.....	9	20	12	0	+	+	+	+	+	+
Worth Spring.....	10	3	7spr.	0	+	0	0	+	+	+
.....	11	10	0	0	0	0	+	+	+	+
Collecting Spring	12	90	10	0	0	+	+	+	+	+
.....	13	70	20	0	+	+	+	+	+	+
Clear's Well.....	14	50	20	0	0	+	+	+	+	+
Sherlock's Well.....	15	50	60	0	0	+	+	+	+	+
McIntyre Store Spring.	16	0	0	0	0	0	0	0	0	0

All of which is respectfully submitted.

A. V. DeLAPORTE,

Chemist in Charge of Experimental Station.

Laboratory Reports for the Year 1916

Laboratories of the Provincial Board of Health, Toronto

Branch Laboratories at Kingston

Branch Laboratories at London (Institute of Public Health)

REPORT OF THE LABORATORIES OF THE PROVINCIAL BOARD OF HEALTH, TORONTO.

To the Chairman and Members of the Provincial Board of Health:

GENTLEMEN,—I have the honour to submit herewith a tabulated statement of the work performed in these laboratories during the year 1916. This has been a record year in the history of the laboratories, as shown by the increase in all main branches of the work. The number of specimens examined shows a total of 10,871, as follows:

Diphtheria (Swabs)		3,436
Release from Quarantine	1,116	
Positive	297	
Negative	819	
Diagnosis	2,320	
Positive	375	
Negative	1,945	
Tuberculosis (Sputum)		2,034
Positive	361	
Negative	1,673	
Typhoid (Blood)		1,267
Positive Widal	334	
Negative Widal	933	
Rabies (Brains of Animals)		92
Negri bodies present	31	
Negri bodies absent	61	
Milk		228
Fat	89	
Total solids	20	
Preservatives	16	
Count	100	
Extraneous matter	3	
Water		3,052
Bacteriological	3,004	
Chemical	48	
Liquor (for License Department):—		403
Alcoholic content		
Miscellaneous (including Coal for Public Institutions)		359
Total		10,871

It appears from our diphtheria data sheets that antitoxin is more generally used in doubtful cases than ever before, owing, no doubt, to its free distribution by the Board. This is a decided advantage, not only in the immediate saving of life but also in the prevention of secondary contact cases. Further control of the spread of diphtheria might possibly be obtained if practitioners would make more use of the laboratories in release cases.

The diagnostic work in tuberculosis, typhoid fever and rabies continues to be greatly appreciated. The methods of examination and manner of reporting were in accordance with established practice.

The number of samples of milk sent the laboratory, while greater than last year, is still much too low. The recent educational work followed by an explanatory “Circular of Laboratory Services” should have the effect of drawing the attention of local Boards of Health to the necessity for analytical control of municipal milk supplies.

The introduction of the Ontario Temperance Act meant a greater number of analyses of liquors. These results are of legal importance, especially in the enforcement of the regulations controlling the sale of beverages.

Analyses of coal, and other supplies for public institutions of the Province were continued this year with satisfactory results.

A very substantial increase in the work of the laboratories is noted in the amount of typhoid vaccine distributed. For vaccine for civilian use the following figures are recorded, 1915, 5,324 doses; 1916, 33,532 doses. On May 1st, 1916, we began the distribution of a polyvalent vaccine, carrying paratyphosus, alpha and beta, and as well typhosus. A uniform, three dose treatment was also recommended. The following are the details of shipments, of vaccine, to the various provinces for use by the Canadian Militia, in the inoculation of overseas troops at the several camps:

Ontario	269,131 doses
Manitoba	115,670 “
Quebec	321,250 “
Nova Scotia	54,650 “
British Columbia	39,000 “
Alberta	27,675 “
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Total	827,376 “

The number of doses sent to the sister colony, Newfoundland, was 3,000.

The results obtained have been reported as highly satisfactory.

H. M. LANCASTER,

Acting Director of Laboratories.

REPORT FROM LABORATORIES OF THE PROVINCIAL BOARD

Municipalities	Diphtheritic swabs				Tuber- culous sputa		Typhoid bloods		Rabies Diagnosis			
	Release		Diagnosis						Animal	Negri Bodies		Animal Inocu- lations
	+	-	+	-	+	-	+	-		+	-	
Algoma—												
Blind River.....								1				
Bruce Mines.....	1	3	6	2		2						
Chapleau.....					2	2						
Chelmsford.....			1	1	1	2						
Copper Cliff.....												
Creighton Mines.....				1		4	2					
Crean Hill.....					1		1	3				
Cutler.....												
Espanola.....							3	1				
Goulais Bay.....							2	1				
Jacksonboro.....												
Jellicoe.....												
Kapuskasing.....												
Levack.....				1				1				
Magpie Mine.....							1					
MacLennan.....												
Richards Landing.....				1		3		2				
Schumacher.....												
Steeltown.....					1	1						
Sault Ste. Marie.....	2	9	5	10	7	25						
South Porcupine.....				1				1				
Thessalon.....			1	1		2		1				
The Slash.....												
Brant—												
Brantford.....				4	9	34		2	dog		1	
Burford.....			1			3	1	2				
Ohsweken.....												
Paris.....	1	3	1	1	2	9						
Scotland.....						2						
St. George.....				1		1		2				
Bruce—												
Allanford.....				2	1	7						
Armow.....												
Chesley.....	1	1	2	4	2	6	1	2				
Cargill.....					2	2		1				
Elmwood.....					3	6		1	dog		1	
Hepworth.....						2						
Kincardine.....				1		1						
Lucknow.....						3		1				
Lorne.....												
Mildmay.....						2						
Paisley.....	3	2	4	8	1	5	1					
Port Elgin.....				3	2	23	5	4				
Ripley.....					1	1						
Southampton.....												
Tara.....		1		1		1		1				
Teeswater.....						3						
Tiverton.....								1				
Walkerton.....				1	2	1	2	2				
Carleton—												
Carp.....				3		4		1				
Hazeldean.....					1							
Kars.....						1		1				
Kinburn.....				3	1	3	1	3				
Manotick.....				6	1	5		1				
Metcalfe.....		1		1	2	5						

OF HEALTH OF ONTARIO AT TORONTO FOR YEAR 1916.

Milk										Waters		Liquors for License Dept.	Miscellaneous Specimens	Total Specimens for year	Outfits sent out					Doses of Anti-Typhoid Vaccine sent out	Pasteur Preventive Treatment																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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OF HEALTH OF ONTARIO AT TORONTO FOR YEAR 1916.—*Continued.*

Milk										Waters		Liquors for License Dept.	Miscellaneous Specimens	Total Specimens for year	Outfits sent out					Doses of Anti-Typhoid Vaccine sent out	Pasteur Preventive Treatment																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
Food Content		Preserv-atives		Bacteriological				Count	Extraneous matter						Chemical	Bacterial	Water	Diphtheria	T. B.		Typhoid	Total Outfits	Cases	Number of Injections																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
Fats	Total Solids	+	-	Tubercle Bac.		Pus cells																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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REPORT FROM LABORATORIES OF THE PROVINCIAL BOARD

Municipalities	Diphtheritic swabs				Tuber- culous sputa		Typhoid bloods		Rabies Diagnosis			
	Release		Diagnosis						Animal	Negri Bodies		Animal Inocu- lations
	+	—	+	—	+	—	+	—				
Halton—Continued.												
Limehouse.....												
Milton.....					1	1	4		2 dogs			2
Norval.....												
Oakville.....					4		1	2	14			
Palermo.....							1					
Sheridan.....												
Haliburton—												
Deer Lake.....									1			
Haliburton.....									1			
Lowbanks.....												
Minden.....												
Hastings—												
Belleville.....				2	11	6	5	14	180			
Bancroft.....												
Coe Hill.....												
Eldorado.....				1	2			2	1			
Deseronto.....												
Frankford.....						2	2		1			
Foxboro.....						2	2		2			
Madoc.....					2	2	4	2				
Marmora.....					4	2	6		2			
Maynooth.....						1	1					
Mill Bridge.....												
Springbrook.....							1	2	1			
Stirling.....												
Steenburg.....												
Sulphide.....												
Trenton.....		2		2	2	1	2	6	3			
Tweed.....												
Huron—												
Blyth.....			3		3		4		dog			1
Brucefield.....					2		1					
Brussels.....					1		2	2	3			
Bluevale.....												
Crediton.....		1	1		2				2			
Ethel.....							1	2	5	Pig		1
Exeter.....						1	2					
Goderich.....		1	1	1			1	4	4	dog		1
Gorrie.....							1					
Fordwich.....					1							
Hensall.....							1					
Kintail.....												
Kippen.....												
Seaforth.....							1	1	2			
Wingham.....		6	3	12	13		6			dog		1
Wroxeter.....												
Kirkton.....							1					
Kent—												
Bothwell.....						1						
Blenheim.....						3		1	1			
Chatham.....				1	2	5	33	3	12			
Dresden.....			3			1	5					
Duart.....						1	2					
Merlin.....				1	2	3	9					
Ridgetown.....		1	1	3			3					
Thamesville.....						1	5					

OF HEALTH OF ONTARIO AT TORONTO FOR YEAR 1916.—*Continued.*

[illegible]

REPORT FROM LABORATORIES OF THE PROVINCIAL BOARD

Municipalities	Diphtheritic swabs				Tuber- culous sputa		Typhoid bloods		Rabies Diagnosis			
	Release		Diagnosis						Animal	Negri Bodies		Animal Inocu- lations
	+	-	+	-	+	-	+	-		+	-	
Kent—Continued.												
Tilbury				1	1							
Tupperville												
Wallaceburg					2	5	1	3				
Kenora—												
Dryden							1					
Keewatin							5					
Kenora												
Lanark—												
Almonte	1	5	4	4	1		2	1				
Carleton Place				1	1		1					
Clayton							1					
Lanark							1	5	2			
Maberley												
Middleville					1		1					
Perth					1		1	3	1			
Pakenham	1	1	1		1							
Smith's Falls					1		3	2				
Lambton—												
Alvinston					1		2					
Brigden					1							
Camlachie												
Corunna							1					
Florence	1	3			2		2					
Forest							2					
Petrolia	1		2	10	1		6					
Pt. Edmund												
Pt. Lambton												
Sarnia			2	7	1		4					
Sombra					1		1	1				
Watford				1			3					
Wilkesport					2		1					
Wyoming					1				1			
Oil Springs												
Thedford				1								
Leeds—												
Athens												
Brockville	3	2			1		9	1	9			
Denbigh												
Elgin												
Lansdowne												
Malloytown				4			1		3			
Napanee												
Newboro												
Plum Hollow												
Tamworth												
Yarker												
Lincoln—												
Beamsville				1			8	1	6 2 dogs	1	1	
Grimsby				3			3	2	3 2 dogs		2	
Jordan				2				5	3			
Merritton												
Niagara-on-the-Lake									4			
St. Catharines		7	2	6	3		24	7	6			
St. David's							1					

OF HEALTH OF ONTARIO AT TORONTO FOR YEAR 1916.—Continued.

Milk										Waters		Liquors for License Dept.	Miscellaneous Specimens	Total Specimens for year	Outfits sent out					Doses of Anti-Typhoid Vaccine sent out	Pasteur Preventive Treatment	
Food Content		Preserv-atives		Bacteriological				Count	Extraneous matter	Chemical	Bacterial				Water	Diphtheria	T. B.	Typhoid	Total Outfits		Cases	Number of Injections
Fats	Total Solids	+	-	Tubercle Bac.		Pus cells																
				+	-	+	-															
...	1	...	...	...	...	...	...	...	...	...	...	...
...	28	...	...	...	25	2	17	2	46	...	...	...
...	74	...	...
...	1	...	...	...	...	...	2	...	...	100	...	...
...	4	...	...	4	24	...	...
...	2	...	...	...	12	...	...	...	12	104	...	...
...	1	...	...	...	...	...	...	...	...	...	...
...	4	...	...	...	4	64	...	...
...	1	...	...	1	12	...	...
...	30	2	4	...	36	86	...	...
...	19	...	...	...	...	12	15	...	27	...	...	...
4	209	...	...	...	225	...	10	12	247	5223	...	...
...	2	...	...
...	20	...	...
...	12	...	...	12	...	...	...
...	1	...	...	...	...	...	...	...	...	...	...	...
...	3	...	...	...	1	2	2	2	7	...	...	...
...	1	30	10	...	41	...	...	...
...	6	...	...
...	1	...	...	...	...	...	...	...	...	...	...	...
...	7	18	3	...	...	18	12	10	...	40	2694	...	...
...	1	...	...	...	...	2	2	...	4	9	...	...
...	3	...	...	...	...	...	...	...	...	48	...	...
...
...	2	1	2	5	18	...	...
...	24	...	...
...
...	1	...	22	...	1	24	24	24	73	108	...	...
...	24	...	...
...	12	10	12	34	10	...	...
...	60	...	...	60	10	...	...
...	18	...	...	18	42	...	...
...	10	...	...
...	12	...	...
...	1	...	...	12	...	...	12	24	...	...
...	12	...	...	12	12	...	...
...	54	...	...
...	5	...	...	...	8	...	10	...	18	1	...	...
...	1	...	2	...	...	12	10	12	34	48	2	42
...	2	2	2	6	...	...	...
...	12	...	...
...	7	...	...	...	...	1	...	...	...	1	...	...
...	105	...	...	...	99	7	42	4	152	147	...	...
...
...
...

REPORT FROM LABORATORIES OF THE PROVINCIAL BOARD

Municipalities	Diphtheritic swabs				Tuber- culous sputa		Typhoid bloods		Rabies Diagnosis			
	Release		Diagnosis						Animal	Negri Bodies		Animal Inocu- lations
	+	-	+	-	+	-	+	-		+	-	
Lincoln—Continued.												
Smithville							1					
Port Dalhousie							2		2			
Welland Port				1	1		1	2	3			
Manitoulin—												
Gore Bay												
Little Current							1		2			
Mindemoya			1									
Middlesex—												
Ailsa Craig			1		1	6		1				
Glencoe												
Grafton						1						
Lobo												
London												
Melbourne							1					
Mt. Brydges					1	1						
Strathroy					1	2						
Southwold St.												
Parkhill												
Thorndale									dog		1	
Muskoka—												
Balla								1				
Bracebridge				2	3	4	1	1				
Gravenhurst			1	1	1	1						
Glenmount												
Huntsville		2	2	7	3	12		3				
Pt. Carling						1						
Pt. Cockburn												
Rosseau				1		3	4	1				
Severn Bridge				1	2	4		3				
Nipissing—												
Cache Bay												
Gowganda							1					
Kirkland Lake								1				
Mattawa							2					
Matheson												
North Bay	4	12	13	22	1	8	1	1				
Sturgeon Falls			1	1	1	6						
Swastika												
Smooth Rock Falls ..									2			
Norfolk—												
Delhi					2		5	2	1			
Langton			2									
Pt. Dover			1						2			
Pt. Rowan					2		6		2			
Simcoe					6	3	8	1	5			
Victoria												
Waterford							3					
Walkington												
Lynedock							2					
Northumberland—												
Brighton						3	4	3				
Campbellford							1	1				
Castleton							2	1	2			
Cobourg			1	7	7	13	4	16				2
Colborne				1	1	6	4	5				

REPORT FROM LABORATORIES OF THE PROVINCIAL BOARD

Municipalities	Diphtheritic swabs				Tuber- culous sputa		Typhoid bloods.		Rabies Diagnosis			
	Release		Diagnosis						Animal	Negri Bodies		Animal Inocu- lations
	+	-	+	-	+	-	+	-			-	
Northumberland—												
Grafton				1			1					
Warkworth							2		3			
Wooler							5		1			
Hastings			1	2			2					
Ontario—												
Atherley				1			1		3			
Beaverton												
Brooklyn							1					
Brougham												
Cannington				2			1	1	2			
Cedarvale												
Claremont			1									
Columbus												
Oshawa				7	1		9		1			
Pickering												
Pt. Perry					1		4	1	4			
Seagrave							3		1			
Saintfield							1					
Sunderland					1		2		1			
Uxbridge					2		12		3			
Whitby					4		4	1	1	dog		1
Zephyr				5								
Oxford—												
Beachville								1	1			
Drumbo			1		1		2					
Embro								2	1			
Ingersoll			1	4	5		28	1	9	dog		1
Mt. Elgin												
Norwich				1					6	{ dog }		1
Otterville							7			{ pig }	1	1
Plattsville				1			6	1	1			
Princeton									2			
Lakeside												
Oxford Centre												
Tavistock				2			3		1			
Thamesford												
Tillsonburg				1	2		9		4	dog	1	
Woodstock				2	5		28	9	14			
Parry Sound—												
Ardbeg									1			
Burk's Falls					9		10	1	3			
Byng Inlet					2		2	1	8			
Calendar									1			
Depot Harbor				2								
Elmsdale												
Kearney			2		6		1					
Maple Lake St.												
Magnetawan						1						
McKellar							2	4	1			
Nipissing												
Nobel												
Parry Sound	3		6	4	19	2	11	11	29			
Powassan					2	2	9	2	9			
Ravensworth												
South River							4					
Sprucedale						1	13		1			
Sundridge					1		6	1	4			

OF HEALTH OF ONTARIO AT TORONTO FOR YEAR 1916.—Continued.

Food Content		Preserv- atives		Milk						Waters		Liquors for License Dept.	Miscellaneous Specimens	Total Specimens for year	Outfits sent out					Doses of Anti-Typhoid Vaccine sent out	Pasteur Preventive Treatment				
				Bacteriological				Count	Extraneous matter						Chemical	Bacterial	Water	Diphtheria	T. B.		Typhoid	Total Outfits	Cases	Number of Injections	
				Tubercle Bac.		Pus cells																			
Fats	Total Solids	+	-	+	-	+	-																		
...	1	...	...	...	...	6	12	10	12	40	...	24	...	...	...
...	2	...	...	...	...	...	2	2	2	6	...	...	...	...	...
...	3	...	...	...	...	...	6	5	18	29	8	...	...	...	...
...	2	...	...	...	...	...	...	...	18	...	...	...	1	21	...
...	1	...	...	...	...	2	...	...	6	6	6	...	...	...	...
...	1	...	...	...	...	...	1	...	1	2	...	...	...	...	...
...	1	27	...	...	...	...	38	2	12	2	54	273	1	21	...	...
...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	3	...	...	...	...	...	2	2	2	6	...	4	...	...	...
...
...	2	...	...	...	...	...	2	2	2	6	...	...	...	...	...
...	2	...	...	...	...	2	...	5	...	7	26	...	...	...	...
...	10	...	33	...	...	6	6	5	6	23	...	...	...	...	...
...
...	7	...	...	...	...	9	...	...	...	9	...	...	...	...	...
...	7	...	...	...	...	6	...	10	...	16	60	...	...	...	...
...	3	...	...	...	...	3	...	...	...	3	18	...	...	...	...
...	20	6	25	12	63	2	1	21	...	...
...	12	...	...	...	...
...	2	2	...	1	...	...	...	...	...	24	27	...	...	...	...	...
...	10	...	...	...	...	...	...	12	36	48	12	1	21	...	...
...	6	10	6	22	16	...	...	...	...
...	12	12	12	...	...	...	...
...	12	10	12	34	...	...	...	...	...
...	24	...	...	...	...
...	1	...	...	...	...	...	12	10	12	34	...	...	...	...	...
...	8	...	...	...	...	8	...	10	...	18	...	...	...	...	...
...	1	...	...	...	...	...	24	65	48	137	60	...	...	...	...
...	4	...	...	...	...	6	...	...	...	6	...	...	...	...	...
...	6	...	...	...	...	...	40	...	...	40	24	...	...	...	...
...	6	...	...	...	...	...	12	12	10	34	...	12	...	...	...
...
...	2	...	...	...	...	...	2	...	...	2	...	...	...	...	...
...	1	...	...	...	...	...	1	...	...	1	110	...	...	...	...
...
...	15	...	...	...	...
...	6	...	...	...	...	...	15	...	...	...	...	...	...	...	...
1	1	...	51	...	...	...	...	88	86	18	38	230	440	...	...	...	...
...	8	...	25	...	33	...	...	...	...	...
...	4	...	...	...	4	...	...	...	...	...
...	220	...	...	...	...
...	2	...	...	...	...	...	6	...	25	...	31	303	...	...	...
...	1	...	...	...	...	...	1	...	...	...	1	12	...	...	...

REPORT FROM LABORATORIES OF THE PROVINCIAL BOARD

Municipalities	Diphtheritic swabs				Tuber- culous sputa	Typhoid bloods		Rabies Diagnosis				
	Release		Diagnosis			Animal	Negri Bodies		Animal Inocu- lations			
	+	-	+	-	+		-	+		-	+	-
Peel—												
Alton .....	.....	.....	.....	1	.....	2	2	1	.....	.....	.....	.....
Bolton .....	.....	.....	.....	2	.....	4	.....	.....	dog	1	.....	.....
Brampton	1	.....	2	2	1	7	.....	.....	{ dog p cat utrid	.....	.....	.....
Caledon .....	.....	.....	.....	2	.....	1	1	4		1	.....	.....
Caledon E. ....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Clarkson .....	.....	.....	.....	1	.....	1	1	.....	.....	.....	.....	.....
Dixie .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Erindale .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lorne Park .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mono Road .....	.....	.....	.....	.....	.....	1	1	1	cat	.....	1	.....
Mono Mills .....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Malton .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Palgrave .....	.....	.....	.....	3	.....	3	.....	2	.....	.....	.....	.....
Pt. Credit	1	2	2	3	.....	2	3	2	.....	.....	.....	.....
Streetsville .....	.....	.....	.....	.....	.....	1	.....	2	.....	.....	.....	.....
Perth—												
Atwood .....	.....	.....	.....	1	.....	1	3	2	.....	.....	.....	.....
Dublin .....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Kirkton .....	.....	.....	.....	.....	.....	3	.....	1	.....	.....	.....	.....
Listowel	4	1	1	5	3	6	2	11	.....	.....	.....	.....
Milverton .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mitchell .....	.....	.....	2	1	1	2	.....	1	.....	.....	.....	.....
Monkton .....	.....	.....	.....	.....	.....	3	.....	2	.....	.....	.....	.....
St. Mary's .....	.....	.....	.....	1	1	3	2	2	dogs	1	1	.....
Sebringville .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Shakespeare .....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Stratford	3	9	2	6	1	19	.....	6	.....	.....	.....	.....
Millbank .....	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	.....
Peterboro—												
Bailieboro .....	.....	.....	.....	1	.....	2	1	1	.....	.....	.....	.....
Havelock .....	.....	.....	.....	1	1	2	.....	1	dog	.....	1	.....
Keene .....	.....	.....	.....	.....	.....	2	1	1	.....	.....	.....	.....
Lakefield .....	.....	.....	.....	.....	.....	1	1	2	.....	.....	.....	.....
Oak Orchard .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Peterboro	52	92	42	164	6	24	8	14	.....	.....	.....	.....
Prescott												
Alfred .....	.....	.....	.....	.....	2	3	.....	.....	.....	.....	.....	.....
Chute à Blondeau .....	.....	.....	.....	.....	.....	1	5	2	.....	.....	.....	.....
Fornier .....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hawkesbury .....	.....	.....	.....	.....	.....	2	.....	3	.....	.....	.....	.....
Lefaiivre .....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....
Plantagenet .....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Riceville	1	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....
St. Eugene .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Isidore de Prescott .....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....
Prince Edward—												
Bloomfield	1	2	2	1	.....	.....	.....	1	.....	.....	.....	.....
Consecon .....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Demorestville .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Picton .....	.....	2	1	4	1	10	1	.....	.....	.....	.....	.....
Wellington .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rainy River—												
Emo .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ft. Frances .....	.....	.....	1	1	1	3	1	.....	.....	.....	.....	.....
Rainy River .....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....
Sioux Lookout .....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....

OF HEALTH OF ONTARIO AT TORONTO FOR YEAR 1916.—*Concluded.*

[illegible]

REPORT FROM LABORATORIES OF THE PROVINCIAL BOARD

Municipalities	Diphtheritic swabs				Tuber- culous sputa		Typhoid bloods		Rabies Diagnosis			
	Release		Diagnosis						Animal	Negri Bodies		Animal Inocu- lations
	+	-	+	-	+	-	+	-				
Renfrew—												
Aurprieur												
Cobden												
Clontarf												
Craigmount					1							
Eganville					1	14		2				
Douglas												
Kartum												
Pembroke												
Petawawa												
Renfrew			3	7	3	16	4	6				
Westmeath			1		1							
Russell—												
Bourget	2	11	5	4	3	3		3				
Clarence Creek				2	1		1	1				
Castleman												
Navan		1	7	18	1	2		1				
Rockland		3		3	1	1	1					
Russell						6						
Simcoe—												
Allandale						1						
Angus				1								
Alliston				1		1						
Barrie				9	4	18	1	9				
Beeton		1	1	7								
Bond Head				1				2				
Bradford					1	2		1				
Camp Borden												
Collingwood		1	5	6	4	12						
Coldwater				5		3	1	2				
Cookstown				2	4	9		1				
Creemore			1	1		3		4				
Churchill						3						
Edgar			1	3				1				
Elmvale						6		2				
Everett						1						
Lisle												
Midland			2		1	2	1	1				
Orillia	8	17	17	130	5	118	9	21				
Penetang	1	1	6	5	1	29	3	11	dog		1	
Phelpston				4		9		2				
Pt. McNicoll				5		2						
Stayner			1	1				2				
Stroud						1						
Hillsdale												
Thornton				2		3			dog		1	
Tottenham					1	1						
Victoria Harbor			1	3	2	6	2	8				
Waubashene				1		1						
Randolph												
Stormont—												
Aultsville				1		1						
Cornwall			3	1		1		1				
Crysler					1	1	1	1				
Farran's Point												
Mille Roches								1				
Newington												
Osnabruck						4						

OF HEALTH OF ONTARIO AT TORONTO FOR YEAR 1916.—Continued.

Milk										Waters		Liquors for License Dept.	Miscellaneous Specimens	Outfits sent out					Doses of Anti-Typhoid Vaccine sent out	Pasteur Preventive Treatment	
Food Content		Preserv-atives		Bacteriological				Count	Extraneous matter	Chemical	Bacterial		Total Specimens for year	Water	Diphtheria	T. B.	Typhoid	Total Outfits		Cases	Number of Injections
Fats	Total Solids	+	-	Tubercle Bac.	Pus cells																
				+	-	+	-														
...	2	...	1	...	...	...	...	...	10	...	...
...	20	...	...
...	6	...	...
...	2	2	2	6	...	...	...
...	2	...	15	...	17	36	...	...
...	6	5	6	17	...	...	...
...	12	...	...
...	59	...	...	120	...	...	...	120	36	...	...
...	5	...	...	...	42	...	...	...	...	...	...	...
...	146	120	73	338	12	...	...
...
...	24	...	...
...	12	...	...
...	24	...	...	24	...	...	...
...	3	...	...	...	...	...	...	...	...	...	...
...	12	6	10	12	40	36	...	...
...	2	2	2	6	...	...
...
...	2	...	...	...	12	10	12	34	24	...	...
...	5	...	...	12	...	...	12	...	...	1	21
...
...	6	...	...	4	...	...	...	4	...	...	...
24	11	...	11	...	...	...	...	24	...	...	14	...	...	8	24	25	...	57	50	...	...
...	87	...	...
...	9	...	...	7	...	15	...	22	...	...	...
...	5	...	5	...	...	...
...
...	24	...	...
...	12	...	...
...	2	2	2	6	...	...	...
...	6	...	...	...	...	...	...	24	...	...
1	35	...	...	265	142	...	322	102	3	14	441	36	...	...
...	6	10	...	10	26	19	10	65	32	...	...
...	1	1	1	3	...	...	...
...	2	...	...	...	2	12	...	...
...	20	...	...
...	2	...	...	...	...	10	...	10	20	...	...
...	1	...	10	...	6	...	...
...	11	...	...	...
...	5	...	...	...	...	1	...	...	12	...	...
...	1	...	...	...	...	...	...	2	...	...	...
...
...	108	5	6	119	40	...	...
...	8	7	8	23	4	...	...
...	10	...	10	...	...	...
...	6	5	6	17	18	...	...
...	10	...	10	10	...	...

REPORT FROM LABORATORIES OF THE PROVINCIAL BOARD

Municipalities	Diphtheritic swabs				Tuber- culous sputa		Typhoid bloods		Rabies Diagnosis			
	Release		Diagnosis						Animal	Negri Bodies		Animal Inocu- lations
	+	-	+	-	+	-	+	-		+	-	
Sudbury—												
Chapleau							1					
Coniston				2			3	1	1			
Massey												
Sudbury			2	2	9	25	1	1				
Warren												
Webbwood			2	1		1			2			
Temiskaming—												
Charlton												
Cobalt			1		3	2						
Cochrane					1	8	8	6				
Englehart												
Haileybury	1			1	1	7						
Hilliardton												
Iroquois Falls			1	2		2						
Matheson												
New Liskeard		2		7	4	17		7				
Timmins							5	7				
Whitney								2				
Thunder Bay—												
Ft. William						1		1	dog		1	
Pt. Arthur				1	1	9		4	dog		1	
Silver Mountain												
Victoria—												
Bobcaygeon							4					
Kinmount				1								
Little Britain				4	1	5						
Lindsay		2		2	6	15	6	7				
Oakwood			1	2		1						
Omemee		2	1	7		4						
Victoria Road			2	2								
Woodville						1						
Waterloo—												
Ayr		1	3	10		7		3				
Baden						2						
Elmira				3	1	10	3	9				
Galt			2	20	10	17	2	11	dog	1		
Hespeler			1	1		1						
Kitchener	26	140	6	19	11	27	1	3	dog		1	
Lynwood					1	2						
New Dundee				5		1						
New Hamburg	1			2	1	3	2	12				
Petersburg												
Preston					3	5		1				
Waterloo		7	25	7	38	5	8					
Wellesley						5	1					
Winterbourne												
Welland—												
Bridgeburg				1				1				
Fenwick						2		1				
Fonthill				2	1		9	3				
Marshville				2				1				
Niagara Falls				1		4		2	2 dogs	1	1	
Pt. Colborne			2	2	1	4	1					
Pt. Robinson				2		2	1	1				

OF HEALTH OF ONTARIO AT TORONTO FOR YEAR 1916.—Continued.

Milk										Waters		Liquors for License Dept.	Miscellaneous Specimens	Total Specimens for year	Outfits sent out					Doses of Anti-Typhoid Vaccine sent out	Pasteur Preventive Treatment																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
Food Content		Preserv-atives		Bacteriological				Count	Extraneous matter						Chemical	Bacterial	Water	Diphtheria	T. B.		Typhoid	Total Outfits	Cases	Number of Injections																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Fats	Total Solids	+	-	Tubercle Bac.		Pus cells																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

OF HEALTH OF ONTARIO AT TORONTO FOR YEAR 1916.—*Concluded.*

Milk										Waters		Liquors for License Dept.	Miscellaneous Specimens	Total Specimens for year	Outfits sent out					Doses of Anti-Typhoid Vaccine sent out	Pasteur Preventive Treatment	
Food Content		Preserv-atives		Bacteriological				Count	Extraneous matter						Chemical	Bacterial	Water	Diphtheria	T. B.		Typhoid	Total Outfits	Cases	Number of Injections
Fats	Total Solids	+	-	Tubercle Bac.		Pus cells																
				+	-	+	-															
...	1	...	...	...	1	...	...	...	1	...	...	...
...	10	...	...	...	12	...	5	...	17	...	...	...
1	1	...	...	55	...	21	...	18	24	...	42	3189	...	...	...
...	3	...	...	...	1	...	10	...	10	...	...	...
...	4	...	...	...	...	...	...	...	1	...	...	...
...	4	...	...	...	...	...	...	...	...	...	...	...
...
...	1	10	...	...	...	24	2	2	2	30	...	...	...
...	1	...	...	...	...	...	...	...	...	...	2	37
...	7	...	...	...	3	...	5	...	5	19	...	...
...	3	180	...	...	...
...	4	...	...	...	...	...	...	...	...	...	...	...
...	1	...	...	...	1	...	...	...	1	...	...	...
...
...	4	257	167	98	...	30	128	...	...	158	3189	27	570
...	1	...	...	...	1	...	...	...
...	24	96	4	...	26	72	2	...	100	18	2	42
...	2	...	...	...	...	...	...	...	...	...	...	...
...	4	...	...	...	6	6	...	...	12	...	...	...
...	2	...	...	...	1	...	...	...	1	...	...	...

REPORT OF THE BRANCH LABORATORY OF THE
BOARD AT KINGSTON

The Chairman and Members of the Provincial Board of Health.

GENTLEMEN,—I have the honour to submit the report of the work done in the local Laboratory of the Provincial Board of Health during the year 1916. In this period 7,700 specimens were examined as per appended table.

Diphtheria :—		788
Swabs for Release from Quarantine	228	
Positive	560	
Negative		583
Swabs for Diagnosis	143	
Positive	440	
Negative		1,099
Sputums for Tubercle Bacilli	250	
Positive	849	
Negative		797
Blood for Typhoid Reaction	243	
Positive	554	
Negative		747
Water for Bacteriological Analysis		21
Milk for Examination (Preservatives, Tubercle Bacilli, etc.)		
Miscellaneous Samples, including Pus, and particularly Naso-pharyngeal Swabs for Meningococci		3,665
Total		7,700

The work of the Branch Laboratory continues to increase, the number of samples being 7,700 as against 5,445 last year.

Respectfully submitted,

W. T. CONNELL,

Assistant Bacteriologist.

REPORT FROM BRANCH LABORATORIES OF THE PROVINCIAL

Municipalities	Diphtheritic Swabs				Tuberculous Sputa		Typhoid Bloods		Rabies Diagnosis			
	Release		Diagnosis						Animal	Negri Bodies		Animal Inoculations
	+	—	+	—	+	—	+	—				
Algoma—												
Thessalon									1			
Bruce—												
Paisley			1						9			
Carleton—												
Manotick			2	7		1		2				
Ottawa					1		1					
Richmond							1					
Metcalfe			1				4		5			
Dundas—												
Brinston							1		1			
Chesterville							2		1			
Iroquois				2								
Morrisburg						1	1	3				
Winchester				1	1		7		1			
Essex—												
Essex							2					
Frontenac—												
Barriefield							6		1			
Flinton								1	3			
Harrowsmith				8	3			1	4			
Inverary												
Kingston	198	475	70	269	73	493	62	286				
Portsmouth	3	29	1	3	81	42	2	4				
Sharbot Lake								2				
Sydenham					1	3	2	5				
Verona						4	1	4				
Wolfe Island						1		4				
Glengarry—												
Dalhousie Mills							1					
Dalkeith					1							
Lancaster				1			1					
Maxville				1	2							
Williamstown					1	3						
Grenville—												
Cardinal					2							
Jasper							1					
Kemptville					1	3	1	6				
Merrickville					4	10	2	2				
Prescott		2	1	3	2	2	2	6				
Spencerville						1						
Hastings—												
Bancroft					2	3	4	2				
Belleville			4	11	10	26	11	14				
Foxboro			1	2	2	1	1	1				
Frankford												
Deseronto					2	2						
Madoc						1		1				
Marlbank						4		1				
Marmora						1						
Melrose					1							
Roslin					2	2	2	2				
Shannonville					1	1		1				
Trenton					1	3						
Tweed					3	1						
Huron—												
Wingham	2	1	4	2	1	8		3				

REPORT FROM BRANCH LABORATORIES OF THE PROVINCIAL BOARD

Municipality	Diphtheritic Swabs				Tuberculous Sputa	Typhoid Bloods	Rabies Diagnosis					
	Release		Diagnosis				Animal	Negri Bodies		Animal In- oculations		
	+	—	+	—	+	—		+	—			
Lanark—												
Carleton Place			2	1	1	5	3	7				
Lanark						2						
McDonald's Corners ...					1	2		1				
Perth				4	2	1	2					
Smith's Falls			1	2	4	8	90	38				
Leeds—												
Brockville	1	6	1	4	4	14	12	26				
Chaffey's Lake												
Delta												
Elgin				1			1	4				
Gananoque	1	2	3	2	3	10	2	4				
Lansdowne			1	22		1	2	8				
Mallorytown				1								
Newboro						3	1					
Westport		1	3	3	1			2				
Lyn												
Lennox and Addington—												
Bath					2	7		1				
Denbigh					1	1						
Napanee				2	5	14	1	11				
Newburg				1		4	1	1				
Odessa					2	12	4	3				
Tamworth				6		3	1	10				
Yarker				1	1	5	13	16				
Manitoulin—												
Gore Bay				3								
Northumberland—												
Campbellford					1			1				
Cobourg						6	1	5				
Port Hope						2		1				
Warkworth						3						
Hastings			1			3		2				
Nipissing—												
Milner												
Peterborough—												
Peterborough					2	6	1	3				
Prescott—												
Fournier	8	12	3	3		2		2				
Hawkesbury					1	4		2				
Vankleek Hill						5	1	1				
Prince Edward—												
Picton					3	6	1	2				
Renfrew—												
Arnprior				2		4						
Calabogie		3	2			2						
Cobden		6		1	1	8	1	1				
Douglas				3	1	9						
Forester's Falls						1						
Killaloe					1	7						
Pembroke			4	2	3	21						
Petawawa												
Renfrew	3	5	8	13	4	12	4	8				
Russell—												
Bourget	7	15	16	30	1							
Clarence Creek			2									
Simcoe—												
Barrie				2		1	1	6				

REPORT FROM BRANCH LABORATORIES OF THE PROVINCIAL BOARD

Municipalities	Diphtheritic Swabs				Tuberculous Sputa		Typhoid Bloods		Rabies Diagnosis			
	Release		Diagnosis						Animal	Negri		Animal Inoculations
	+	—	+	—	+	—	+	—				
Stormont—												
Aultsville			1		1							
Cornwall			6	11	4	6	5	7				
Finch	5	3	3	2	1	2						
Newington.....			1	8		4	1	5				
Temiskaming—												
Cobalt						1						
Victoria—												
Lindsay						1		1				
Grand Total	228	560	143	440	250	849	243	554				

OF HEALTH OF ONTARIO AT KINGSTON FOR THE YEAR 1916.—*Concluded.*

Milk									Waters		Liquors for License Dept.	Miscellaneous Specimens	Total for Year
Food Content		Preservatives		Bacteriological				Extraneous Matter	Chemical	Bacterial			
Fats	Total Solids	+	—	Tubercle Bac.		Pus Cells								Count
				+	—	+	—						
.....	3	.....
.....
.....
.....	1	.....
.....
3	3	.....	3	.....	3	.....	3	3	3	.....	747	....	3665

REPORT OF THE BRANCH LABORATORY OF THE
BOARD AT LONDON (INSTITUTE OF
PUBLIC HEALTH)

The number of Laboratory examinations made by the Branch Laboratory of the Provincial Board of Health at London (Institute of Public Health) in 1916 shows a marked increase over 1915. The increase was 35 per cent. There has also been an increase of 20 per cent. in the number of communities taking advantage of the laboratory service.

Examination.	1915	1916	Increase. .
Diphtheria Swabs	1,472	2,512	71%
Tuberculous Sputa	484	955	97%
Typhoid Blood	243	197	-20%
Milk (samples examined for fats and preservatives)....	377	.....	-100%
Milk (Bacteriological Analysis)	125	.....	-100%
Water (Chemical Analysis)	152	169	11%
Water (Bacteriological Analysis).....	155	221	30%
Total	3,008	4,050	35%
Communities served.....	80	96	20%

H. W. HILL,
Director.

REPORT FROM BRANCH LABORATORIES OF THE PROVINCIAL BOARD

Municipalities	Diphtheritic Swabs				Tuberculous Sputa		Typhoid Bloods		Rabies Diagnosis			
	Release		Diagnosis						Animal	Negri Bodies		Animal Inoculations
	+	—	+	—	+	—	+	—				
Brant—												
Paris		2	1	6								
Bruce—												
Chesley						1						
Lucknow					1	5						
Paisley												
Walkerton				5		2						
Durham—												
Millbrook						3						
Elgin—												
Dutton		2		3		2						
Lawrence Station					1	2						
St. Thomas			1	8	1		1	2				
West Lorne		5		3		1						
Essex—												
Comber								3				
Essex		1				1		1				
Ford City		4										
Harrow			3	1								
Kingsville						1		1				
Sandwich		2				1		1				
Walkerville		4		4		1						
Windsor	9	48	8	41	1			3				
Halton—												
Campbellville					1							
Huron—												
Brucefield						1						
Clinton							1	2				
Crediton		2		2					2			
Goderich									2			
Hensall						1						
Wingham				1		2						
Zurich		1		1				2				
Haldimand—												
Dunnville							1					
Kent—												
Blenheim				14		3	3	8				
Chatham		1		2	2	12		2				
Dresden					1			3				
Duart					3	1						
Exeter								1				
Merlin						1						
Ridgetown		1			1	5	1	3				
Thamesville		1		2		3	1					
Tilbury		1	1		1							
Wallaceburg			1		1	1	2	2				
Wheatley						3						
Lambton—												
Arkona		1	1	2	2			1				
Brigden		1		1		2						
Camlachie	3	2		1				1				
Courtright						2						
Florence						1						
Forest				1		2						

REPORT FROM BRANCH LABORATORIES OF THE PROVINCIAL BOARD

Municipalities	Diphtheritic Swabs				Tuberculous Sputa	Typhoid Bloods		Rabies Diagnosis				
	Release		Diagnosis					Animal	Negri Bodies		Animal Inoculations	
	+	—	+	—	+	—	+		—			
Lambton—Con.												
Inwood		1		3	2	2		1				
Oil Springs						3	1					
Petrollea.....	2	5	2	4	2	2						
Pt. Lambton						1		2				
Sarnia				1	1	1						
Sombra.....								2				
Watford	1	5	2	1	1	4		6				
Wyoming					3	2	1	3				
Lincoln—												
Grimsby.....								1				
Middlesex—												
Appin.....				1	1							
Belmont					1							
Byron				5	8	16						
Dorchester.....								1				
Glencoe.....		1			2	6						
Granton					1	2	1	1				
Harrietsville.....					1							
Hyde Park						3						
Lambeth.....						1						
Lobo.....		1	1									
London	180	775	134	1,144	125	631	23	75	Dog		2	
Lucan				2		3						
Melbourne						1		2				
Mt. Brydges						2						
Newbury					3							
Parkhill.....		3		3								
Poplar Hill						1						
Strathroy.....								1				
Thorndale.....					1							
Wardsville.....						2						
London Twp.....												
Norfolk—												
Langton						1						
Northumberland—												
Cobourg.....						1						
Oxford—												
Embro.....					1	2						
Ingersoll.....				5	1	4		2				
Lakeside.....					1	2		1				
Mount Elgin												
Norwich				1								
Plattsville					1							
Tavistock												
Thamesford.....					2	2						
Tillsonburg					1			2				
Woodstock					2	1	7	1	4			
Perth—												
Listowel								2				
St. Mary's		1		2	3	3		2				
Stratford				3	2	4	1					

REPORT FROM BRANCH LABORATORIES OF THE PROVINCIAL BOARD

Municipalities.	Diphtheritic Swabs				Tuberculous Sputa		Typhoid Bloods		Rabies Diagnosis			
	Release		Diagnosis						Animal	Negri Bodies		Animal inocu- lation
	+	—	+	+	+	—	+	—		+	—	
Thunder Bay— Pt. Arthur				1								
Waterloo— Galt.....				12	1	1	1					
Kitchener.....						1	1	1				
New Dundee.....						2	1					
Wellington— Alma							1					
Guelph							1					
Wentworth— Hamilton							2	6				
Totals.....	195	871	155	1,291	180	775	43	154			2	

OF HEALTH OF ONTARIO AT LONDON FOR THE YEAR 1916.—*Concluded.*

Milk										Waters		Liquors for License Dept.	Miscellaneous Specimens	Total for year.
Food Content		Preservatives		Bacteriological					Extraneous Matter	Chemical	Bacterial			
Fats	Total Solids	+	—	Tubercle Bac.		Pus Cells		Count						
		+	—	+	—	+	—							
.....	1
.....	6	6	.....	.....	27
.....	17	17	.....	.....	37
.....	3
.....	1
.....	1
.....	8
.....	169	221	.....	.....	4,050

Provincial Board of Health of Ontario Experimental Station

BULLETIN No. 5

SOME EXPERIMENTS ON SOLUBILITY OF ALUM

By MISS G. E. GALLINGER, B.A.

Assistant Chemist Experimental Station

REPORT UPON FILTER ALUMS USED IN ONTARIO

By MISS G. E. GALLINGER and MESSRS. A. V. DeLAPORTE and F. A. DALLYN

DESIRABLE FEATURES FOR ALUM FEED APPARATUS USED IN WATER PURIFICATION PLANTS

By F. A. DALLYN, C.E.

Provincial Sanitary Engineer

A COMPILATION OF RECOMMENDED METHODS FOR THE PHYSICAL AND CHEMICAL EXAMINATION OF SEWAGE AND WATER

By A. V. DeLAPORTE, B.A.Sc.

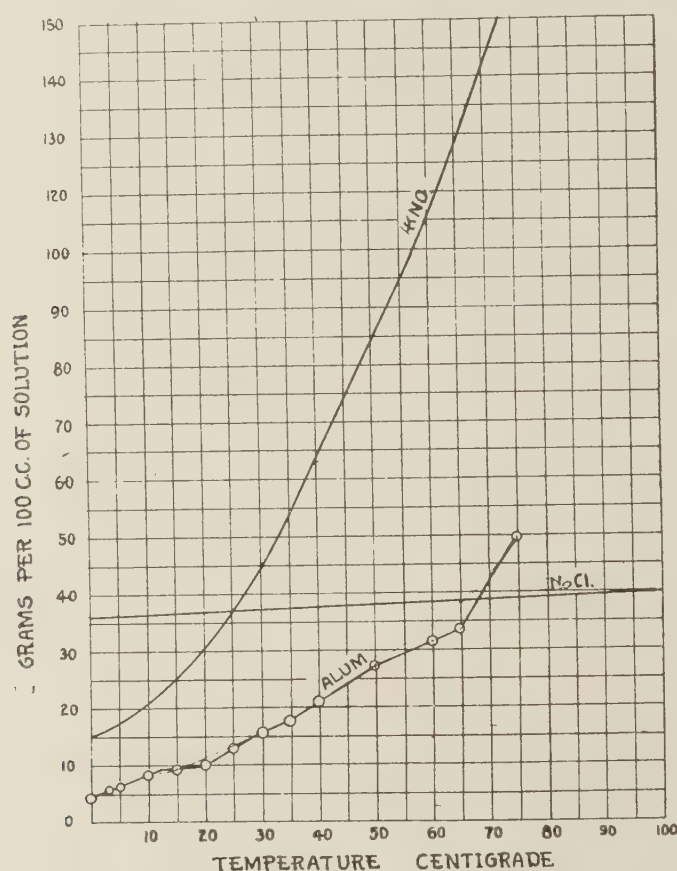
Chemist in Charge of Experimental Station

SOME EXPERIMENTS ON THE SOLUBILITY OF ALUM.

BY MISS G. E. GALLINGER, B.A.

In many purification plants prior to sand filtration and chlorination, alum is used as a precipitant. In view of the different types of alum feed apparatus now on the market, or in course of design, it is a fundamental necessity that some appreciation be had of the behaviour of alum in solution. Published information regarding the physical properties of alum was found to be very meagre, and the experiments herein reported upon have been performed in the Laboratory of the Provincial Board of Health Experimental Station, for the purpose of demonstrating and making available certain facts and information bearing on the solubility of alum.

THE SOLUBILITY OF ALUM AT DIFFERENT TEMPERATURES AND IN DIFFERENT SOLVENTS.



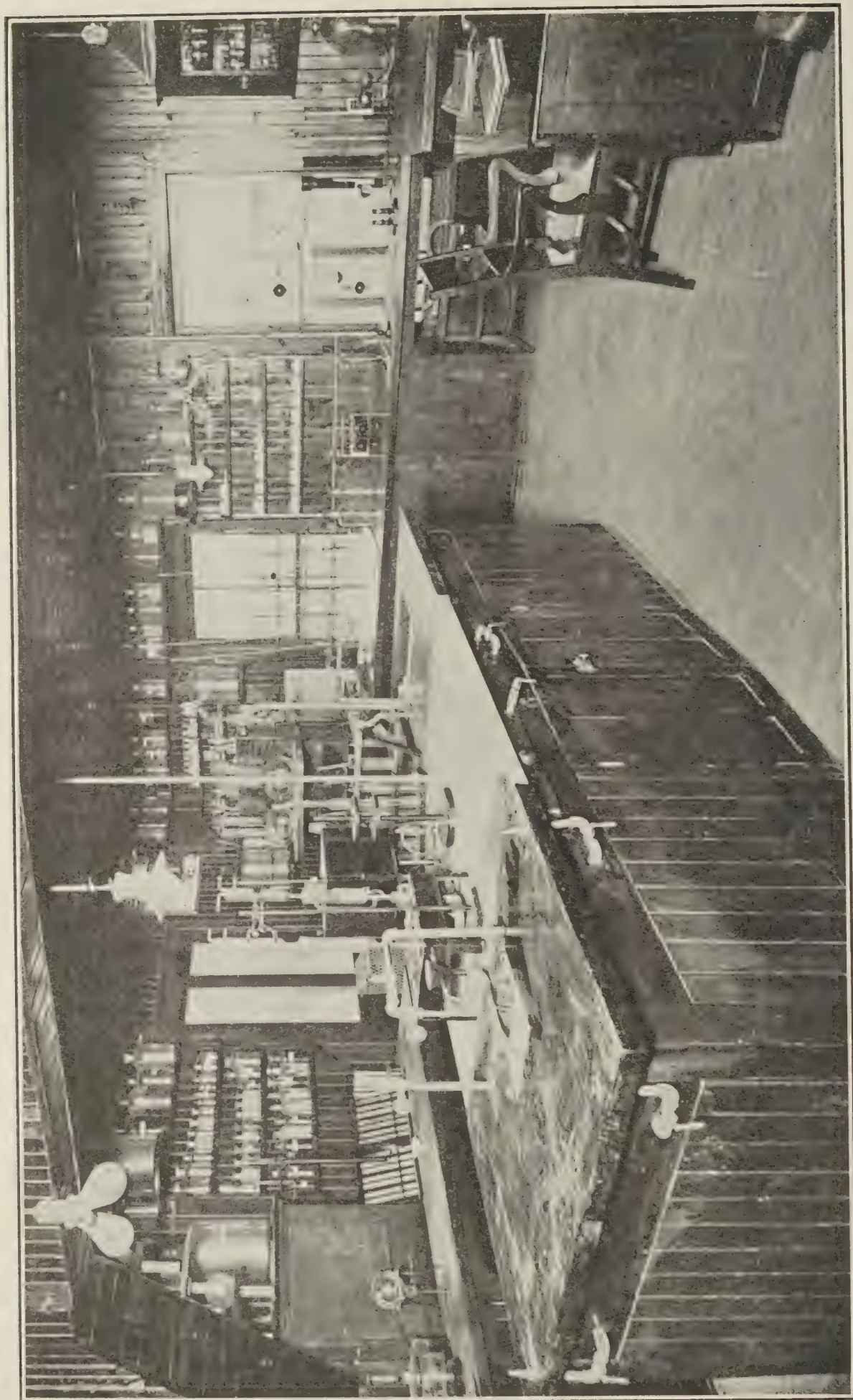
Comparison of the Effect of Temperature on the Solubility of Alum, Potassium Nitrate and Common Salt

Early experiments on the solubility of alum showed that a solubility table for filter alums at different temperatures cannot readily be made. Examination of numerous samples of commercial alum at the Experimental Station shows that the composition of the different commercial alums varies greatly, even alum shipped by the same company from week to week varies in composition and consequently in solubility. In several experiments the difficulty of obtaining a recrystallization of certain filter alums was also experienced; this seemed to be due to the formation of colloidal solutions, or because of some new phase in the solution.

In the experiments herein reported a white crystalline ammonium alum was used, containing upon analysis Al_2O_3 10.8 per cent.; SO_3 31.0 per cent.; Fe_2O_3 .006 per cent.; NH_3 4.5 per cent.; FeO nil; insoluble matter nil.



Bacteriological Laboratory, Experimental Station.



Chemical Laboratory, Experimental Station.

The results of the tests are believed to be reasonably accurate, and it may be mentioned that great difficulty was experienced in obtaining a technique for these experiments, and that, even with the greatest care and accuracy, it was very difficult to overcome error in result. The amount of work necessary was also considerable, more than one hundred titrations being made in some instances for each, considered temperature when determining the rate of solubility.

The accuracy of the solubility determinations depended on the fact that the temperatures used were all beyond the transition interval; it is impossible otherwise, according to Findlay, to dissolve alum, a double salt, in water without decomposition.

While performing the solubility experiments very slight variation in results was encountered, one or two exceptions, however, were notable. On one occasion although the temperature had been lowered from 60° C. to 35° C., the solubility did not decrease for several hours. This result may have been due to transformation and to the existence of a metastable phase in the solution, since it is known that the phase most stable under the given conditions is not always the one found to be present in the system. In this particular case even after some solid alum was introduced into the system the transition to the new phase took place very slowly.

A peculiar phenomenon was noticed on several occasions during experiments on the rate of solution of alum at higher temperatures. As the solution became more highly concentrated, having been in contact with the solvent for several hours, it was found upon analysis that the percentage of alum dissolved decreased for a time then resumed a normal increase; this variation was probably due to some action of the alum on the glass at the higher temperatures.

METHOD.

The solubility was taken as the amount of alum that will dissolve in a given amount of liquid at a given temperature; and a saturated solution as representing a state of equilibrium between two phases, the solution and the undissolved substance.

The solvent was heated in an open vessel* with excess alum to a temperature higher than that at which the solubility was to be determined. The solvent was then cooled to the required temperature in contact with the solid. A part of the solution, after the excess of alum above that required to form a saturated solution had separated out, was removed, and the amount of the dissolved substance contained in it was determined by volumetric analysis. The solubility was expressed as the number of grams of the solute taken up by 100 parts by volume of the solvent.

A solution of the alum saturated at 100° C. was allowed to cool and samples were taken at different temperatures. The samples were titrated against a standard solution of sodium hydroxide of such strength that 1 c.c. NaOH was equivalent to 0.01 grams of alum. The solubility was given directly from the difference in the burette readings. The experiments were all carried out on a laboratory scale and glass beakers of 600 c.c. capacity were used. A water-jacketed oven was used in

*The effect of pressure on solubility of alum, determined by Von Stackelberg, shows that at 18° C. with a pressure of 1 atmosphere, the solubility of alum is 0.115, while with a pressure of 500 atmospheres the solubility is 0.142. Pressure makes a very slight alteration of solubility, and for practical purposes the solubility, as determined under atmospheric pressure, is taken as the true solubility, that is, the solubility when the system is under pressure of its own vapour.

these experiments, and the temperature was kept constant through the use of a thermostat gas regulator. Sufficient time for complete separation of the solid at each temperature was allowed before the samples were taken.

TECHNIQUE.

Placed 250 c.c. of liquid in a 600 c.c. beaker, heated to boiling and added alum until some remained undissolved, allowed solution to cool until temperature was 75°C , then placed beaker in a constant temperature oven for approximately one hour. After stirring well transfer sample to a beaker through a pipette, heated to same temperature as sample. Washed pipette with 10 c.c. of hot water; added one drop of indicator and titrated against standard sodium hydroxide. This method was used in each experiment.

Referring to Table No. I, column 1, the solubility of alum in Toronto tap, Lake Ontario water, increases very slowly at the lower temperatures but with increase of temperature above 20°C . the solubility rises with considerable rapidity.

With the present equipment in many water purification plants it is impractical to heat the alum solution water; in such plants, it is, therefore, evidently impossible to either store or feed alum in the form of a highly concentrated solution.

In column II and column III the solvent action of a slightly acid water is shown. With a 0.1 per cent. sulphuric acid solution the solubility at low temperatures is below that of water, but above 45°C . the acid solution forms a better solvent than water. The same is true of a 1 per cent. sulphuric acid solution.

At ordinary temperatures tap water is a better solvent than a sulphuric acid solution, and the presence of sulphuric acid in solution has a retarding effect on alum solubility.

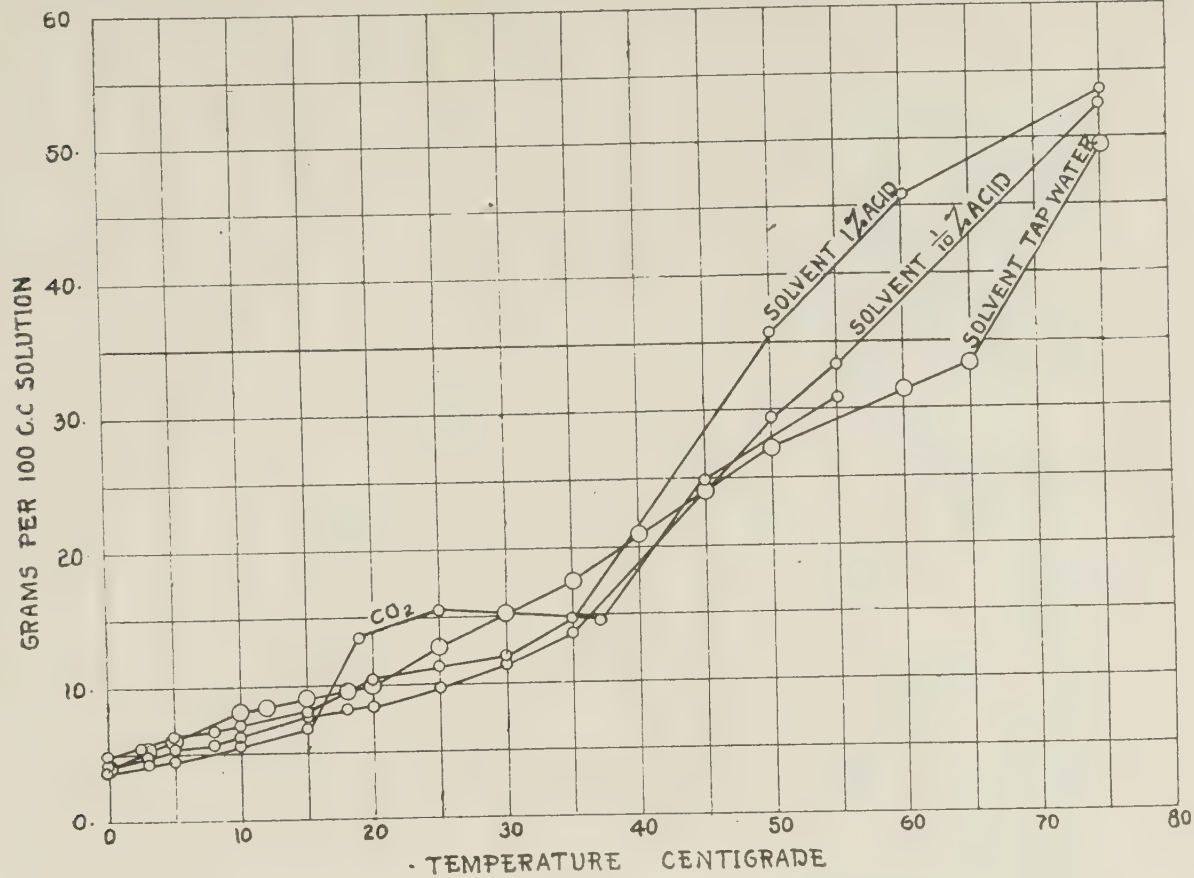
Column IV shows the solubility of alum in a saturated solution of carbon dioxide. The solubility is also much less at low temperatures than in water, but it is greater than water at temperatures above 45°C .

The experiments show that the temperature coefficients of solubility are invariably positive within the temperature range 0°C . to 75°C . The curve representing the change of concentration of the components in the solution with the temperature shows considerable irregularity, possibly due largely to the production of different phases in the system and also to the changes in the density of the solvent with change of temperature.

Using the results obtained by Senter for potassium nitrate and sodium chloride solubility, a direct comparison with alum has been made on page 124. A very low alum solubility between temperatures of 0°C . and 25°C . is apparent.

RATE OF SOLUTION OF ALUM.

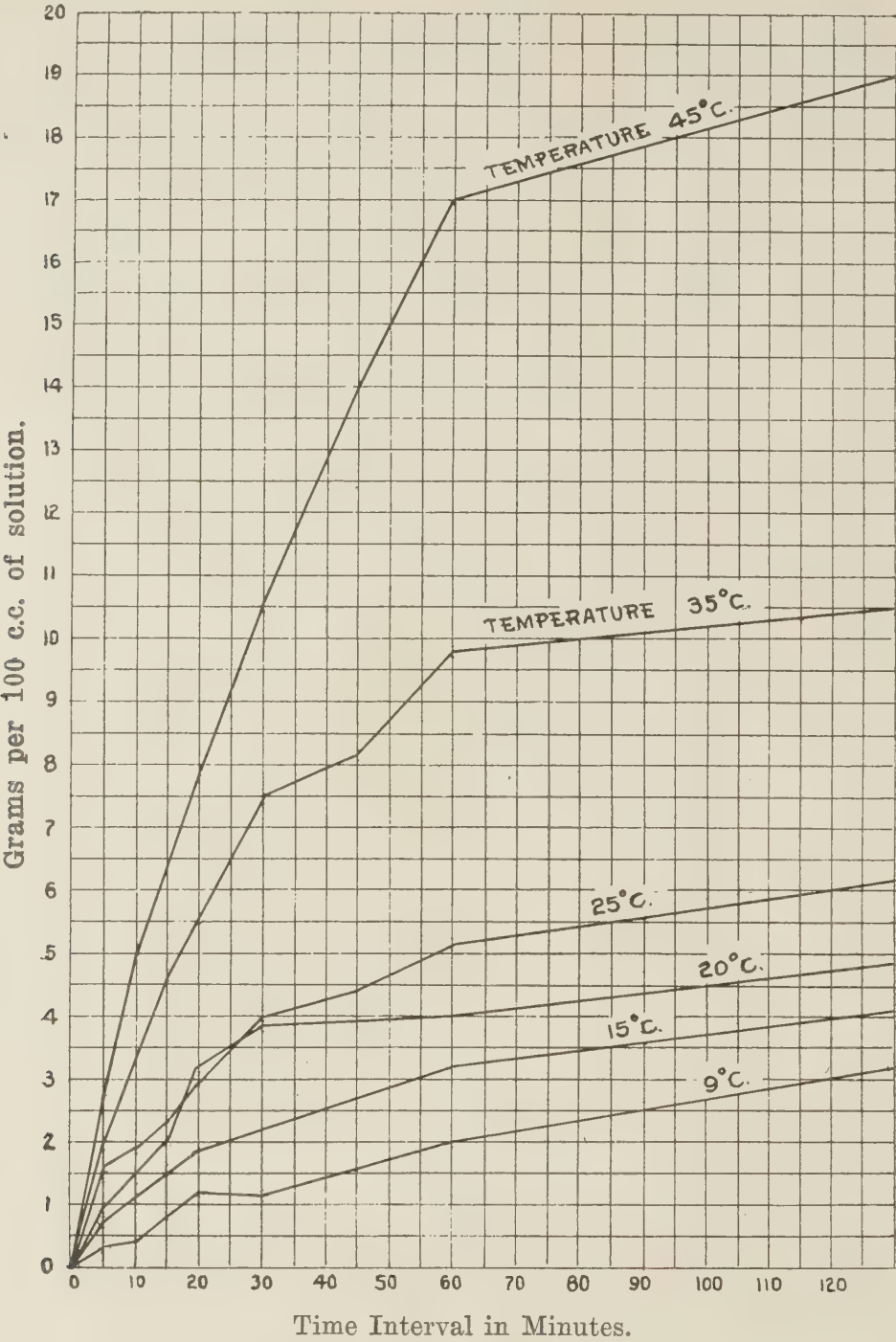
250 c.c. tap water of a definite temperature were placed in a 600 c.c. beaker. A definite quantity of alum was added, care being taken to use crystals of uniform size in each experiment. Samples were taken at different intervals and titrated as before against standard NaOH.



SHOWING THE EFFECT OF TEMPERATURE UPON SOLUBILITY OF ALUM IN SEVERAL SOLVENTS.
TABLE NO. 1.

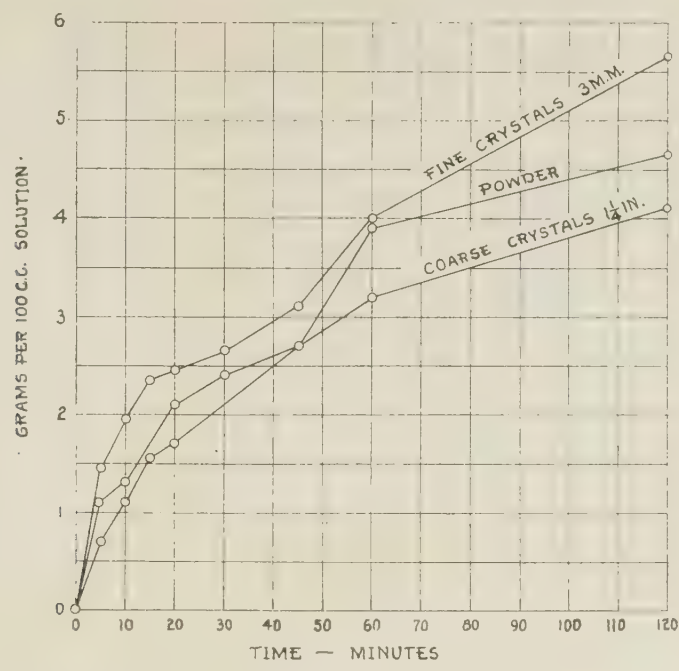
Temperature.	Column I.	Column II.	Column III.	Column IV.
Degrees Centigrade.	% alum solubility when using tap water, Toronto, Ont.	% solubility when using 0.1% H ₂ SO ₄ medium, and dis-tilled water.	% solubility when using 1.0% H ₂ SO ₄ medium, and dis-tilled water.	% solubility when using CO ₂ medium, and dis-tilled water.
0	4.0	4.1	4.9	3.85
3	5.2	4.7	5.5	4.3
5	6.0	5.5	6.2	4.5
8	8.0	5.65	6.6	5.6
10	8.5	6.2	7.0	6.8
12	9.0	7.6	8.0	8.8
15	9.5	8.1	8.1	10.0
18	10.0	8.3	10.4	11.4
19	10.5	9.7	11.2	13.65
20	11.0	11.4	12.0	14.5
25	12.7	13.65	14.7	15.3
30	15.1	14.5	15.3	20.9
35	17.5	17.5	17.5	24.0
37	20.9	20.9	20.9	29.5
40	24.0	24.0	24.0	35.8
45	27.0	27.0	27.0	45.8
50	35.8	35.8	35.8	53.5
55	45.8	45.8	45.8	53.5
60	53.5	53.5	53.5	53.5
65	53.5	53.5	53.5	53.5
75	53.5	53.5	53.5	53.5

No determinations made at these temperatures.



SHOWING RATE OF SOLUTION OF ALUM IN TAP WATER AT DIFFERENT TEMPERATURES.
TABLE NO. 2.

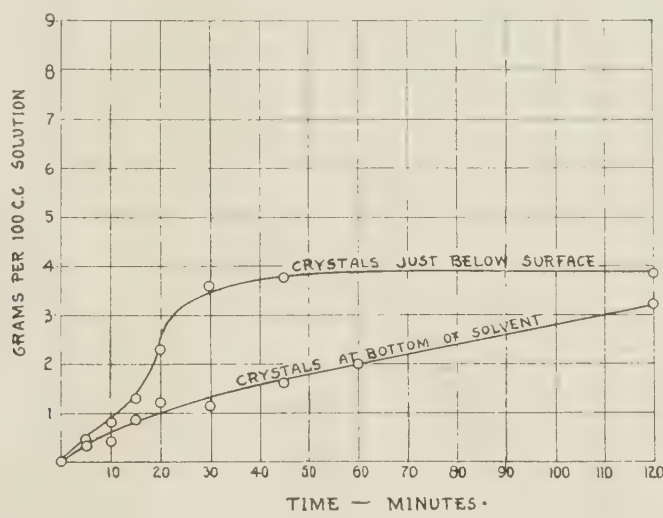
Temperatures Centigrade.	After 5 min.	After 10 min.	After 15 min.	After 20 min.	After 30 min.	After 45 min.	After 60 min.	After 2 hours.
9°	.3	.4	.85	1.2	1.15	1.6	2.0	3.2
15°	.7	1.1	1.55	1.7	.....	2.7	3.2	4.1
20°	.95	1.4	2.0	3.2	3.85	3.9	4.0	4.85
25°	1.6	1.9	2.3	3.0	4.0	4.4	5.15	6.2
35°	1.95	3.3	4.65	5.55	7.45	8.15	9.8	10.5
45°	2.8	5.05	.....	7.9	10.5	14.0	17.0	19.0



SHOWING EFFECT OF SIZE OF ALUM CRYSTALS UPON RATE OF SOLUTION. TABLE NO. 3.

No.	Temperatures Centigrade.	After 5 min.	After 10 min.	After 15 min.	After 20 min.	After 30 min.	After 45 min.	After 60 min.	After 2 hours.
*1	15°	1.1	1.3	.....	2.1	2.4	2.7	3.9	4.65
2	15°	1.45	1.95	2.35	2.45	2.65	3.1	4.0	5.65
3	15°	.7	1.1	1.55	1.7	.....	2.7	3.2	4.1

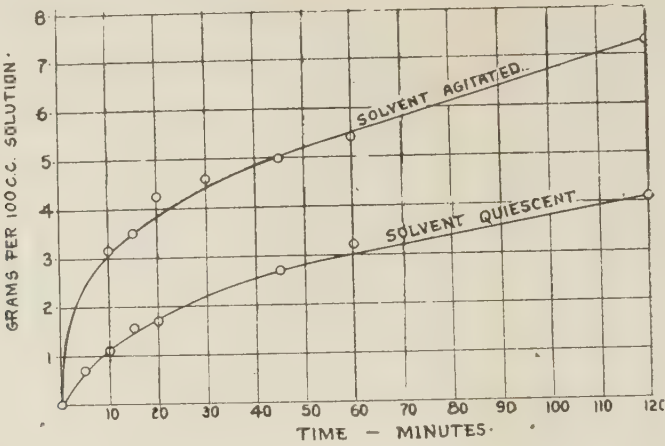
* 1. Powdered alum ; 2. 3 mm. crystals ; 3. 1½ inch crystals.



SHOWING THE INFLUENCE OF THE POSITION OF ALUM CRYSTALS IN SOLVENT UPON RATE OF SOLUTION OF ALUM. TABLE NO. 4.

	Temp. C.	5 min.	10 min.	15 min.	20 min.	30 min.	45 min.	60 min.	2 hr.
No. 1.....	15°	.7	1.1	1.55	1.7	.....	2.7	3.2	4.1
No. 2.....	15°	.6	1.25	1.6	1.85	2.15	2.7	3.65	4.3

No. 1 crystals placed at bottom of solvent.
No. 2 crystals placed in basket just below surface of solvent.



SHOWING EFFECT OF USING AGITATION TO ASSIST DIFFUSION. TABLE No. 5.

Temp. C.	after 5 min.	10 min.	15 min.	20 min.	30 min.	45 min.	60 min.	2 hrs.	Treatment.
15°	2.6	3.15	3.5	4.25	4.6	5.0	5.4	7.3	Solution constantly agitated by electric stirrer throughout experiment.
15°	.7	1.1	1.55	1.7	.....	2.7	3.2	4.1	Solution stirred just before taking samples.

In tap water alum dissolves very slowly at low temperatures. At 9° C. after two hours the solution was only 41.5 per cent. of saturation (1 C. the ratio of 3.2 to 7.7) but at a temperature of 45° C. after two hours the solution was 79.2 per cent. of saturation (1 C. the ratio of 19.0 to 24.0).

With a weak acid solution the rate of solution is faster than with water. In 20 minutes at 15° C. 1.75 grams had dissolved per 100 c.c. of water, while 2.5 grams had dissolved in weak acid. This accelerating action of acid may be due to dissociation.

SHOWING THE INFLUENCE OF SOLVENTS OTHER THAN WATER UPON RATE OF SOLUTION OF ALUM. TABLE No. 6.

Temp. C.	5 min.	10 min.	20 min.	30 min.	45 min.	60 min.	2 hrs.	Solvents.
15°	1.2	1.55	2.0	2.5	3.05	3.15	4.25	Using 0.1% H ₂ SO ₄ .
15°	1.05	1.3	1.45	1.9	2.75	3.05	4.2	Using 1.0% H ₂ SO ₄ .
15°	.7	1.1	1.75	.....	2.7	3.2	4.1	Using tap water. Temp. hardness 94.

SHOWING RATE OF SOLUTION OF ALUM IN 0.1% H₂SO₄. TABLE No. 7.

Temp. C.	5 min.	10 min.	15 min.	20 min.	30 min.	45 min.	60 min.	2 hrs.
5°	.....	.....	.....	.....	.....	.....	.....	.....
8°	.4	.....	1.2	.....	2.5	3.6	3.7	4.0
15°	1.2	1.55	2.0	2.5	.....	3.1	3.15	4.25
18°	1.4	.....	2.1	.....	3.6	4.8	5.8	6.7
20°	1.6	2.5	2.8	3.45	4.1	4.9	6.1	7.45
30°	1.9	2.8	3.3	3.9	5.1	6.1	6.5	7.9
35°	2.3	3.9	6.7	8.3	9.9	12.1	13.0	12.4
45°	3.9	6.1	.....	8.4	12.5	14.5	15.3	18.6

RATE OF SOLUTION OF ALUM IN 1% H₂SO₄. TABLE No. 8.

Temperature Centigrade.	5	10	15	20	30	45	60	2 hrs.
5°	.....	.....	.....	.....	.....	.....	.....	.....
10°	1.5	1.7	2.8	3.1	3.5	3.8	4.8	5.8
15°	1.05	1.3	1.45	1.9	.....	2.75	3.05	5.2
25°	1.7	1.9	2.8	4.0	4.5	6.0	8.4	9.3
35°	1.9	3.0	5.1	6.9	8.2	11.3	13.7	16.5
45°	5.2	7.0	.....	8.5	11.5	12.6	15.1	20.6

SHOWING THE RATE OF SOLUTION OF ALUM AT 10° C. TABLE No. 9.

Condition of Solvent or Position of Solute	After 5 min.	After 10 min.	After 15 min.	After 20 min.	After 30 min.	After 45 min.	After 60 min.	After 2 hrs.
Using tap water as solvent and 1¼ in. crystals placed at bottom of solvent .....	.3	.4	.85	1.2	1.15	1.6	2.0	3.2
Using tap water as solvent and crystals placed in basket just below surface of liquid .....	.45	.8	1.3	2.3	3.6	3.75	....	3.85
Using powdered alum ...	.55	.9	1.25	1.4	1.95	2.5	3.3	3.95
Using 3 m.m. crystals...	.45	1.1	1.3	1.6	1.85	3.0	3.4	4.55
Using 0.1% H ₂ SO ₄ solvent and distilled water	.4	....	1.2	....	2.5	3.6	3.7	4.0
Using tap water and agitating liquid constantly with an electric stirrer	1.7	2.2	3.9	4.0	4.1	4.2	4.6	6.2

Crystals of alum placed at the bottom of a solvent dissolve much more slowly than when the crystals are near surface of solvent, since the dissolved alum is denser than the solvent and hence does not diffuse except by displacement, and it may be possible in a vessel containing a saturated solution in the bottom to have less than 1 per cent. of saturation in the top. See Table 10.*

*TABLE 10.

Samples taken from	% Alum in Solution	
	After 1 day,	After 5 days.
0 bottom of cylinder.....	7.82	7.82
3 upper coil of crystals	7.82	7.82
4— 1" above crystals		1.50
5— 2" " "		0.96
6— 3" " "		0.50
7— 4" " "		0.49
8— 5" " "	0.48	0.48
9— 6" " "		0.47
10— 7" " "		0.47
11— 8" " "		0.45
12— 9" " "		0.44
13—10" " "	0.41	0.41
14—11" " "		0.41
15—12" " "		0.41
16—13" " "		0.41
17—14" " "		0.41
18—15" " "		0.41

*Experiment by Mr. O. Lye, 1915. Provincial Board of Health Experimental Station.

Agitation has a marked effect on rate of solution owing to the slow rate of diffusion, due probably to the formation of pockets.

From the experiments it may be seen that the concentration of the alum solution can be increased in several ways, provided always that an excess of solid alum is in contact with the solution. The most important factor influencing the concentration of alum in solution is the temperature. Time also must be considered as the rate of solution is low enough to affect the size of alum feed tanks used in filtration plants, about four hours is required to dissolve the quantity of alum being used in ordinary plants. Another very important factor is the means adopted to promote diffusion. Agitation when dissolving alum increases the rate of solution so considerably that agitation or stirring devices are of great value in mixing drums. Their advantage in stock solutions is, however, negligible.

REPORT UPON FILTER ALUMS USED IN ONTARIO.

BY MISS G. E. GALLINGER AND MESSRS. A. V. DELAPORTE AND F. A. DALLYN.

The development of water purification in the Province, and more especially, the introduction of rapid sand filter plants, has brought new and peculiar duties to the Board of Health. At present an important matter under consideration is the quality of alum or sulphate of alumina offered for sale for water purification purposes. It is extremely necessary that a proper or satisfactory aluminium sulphate should be used in connection with the operation of mechanical filters.

For the past ten years the smaller municipalities in Ontario have been purchasing alum to satisfy their local requirements, amounts ranging from two to twenty tons per annum—through local supply houses or druggists. The importance of the filter alum supply has recently been greatly enhanced through the completion at Toronto of a water purification plant requiring the purchase of from 700 to 900 tons of alum per annum.

The investigation of the various filter alums supplied through the local agencies was undertaken by the staff at the laboratory at the Board's Experimental Station. The return of inquiry sheets showed, with few exceptions, that the alum supplied to smaller municipalities had passed through four or five hands before reaching them, and that the price paid by adjoining municipalities for aluminium sulphate varied widely. During the last two years the prices have varied from 1.9 cents to as high as 7 cents per lb., depending on the amount purchased; the latter represents the prices when purchased in small quantities.

Apart from the economic question of added cost, there is grave danger, when the local agency is unaware of the source of supply, that alum furnished in this way may be found unsuitable for the purpose of water purification. Several striking incidents of this nature were discovered during the laboratory investigation.

The investigation also revealed the fact that the average municipality purchased its alum without a knowledge of what was required.

The analysis of the alums received by the Board appear in Table No. 1.

TABLE No. 1.

- ANALYSIS OF FILTER ALUMS OFFERED FOR SALE IN ONTARIO AND USED 1916-1917.

Source of Filter Alum (Municipality)	Al ₂ O ₃	SO ₃	Basicity ratio	Fe ₂ O ₃	FeO	Insoluble matter	NH ₃
Toronto, July 13th, 1917	19.5	38.6	.138	0.375	0.34	trace	.....
Toronto, Aug. 8th, 1917.....	19.5	37.6	.015	0.4	0.37	0.4	.....
Perth	19.4	40.6	.06	0.275	0.23	0.079	.....
St. Thomas	19.3	39.0	.10	0.4	0.37	0.1	.....
Toronto, Sept. 12th, 1917.....	19.3	32.2	.3	0.46	0.41	0.056	.05
Dundas.....	18.8	43.3	.02	0.3	0.25	trace	.03
Toronto, July 24th, 1917	18.7	38.9	.011	0.4	0.37	trace	.04
Toronto, July 31st, 1917	18.7	41.2	.025	0.5	0.47	trace	.....
Haileybury	18.7	38.0	.01	0.3	0.28	0.1	.03
Toronto, Aug. 31st, 1917	18.64	33.7	.25	0.58	0.53	0.07	.028
Lindsay (lump)	18.56	38.2	.128	0.47	.....	0.2	.....
Renfrew	18.2	38.6	.098	0.35	0.31	0.075	.....
Cobourg	18.2	36.3	.16	0.3	0.27	0.05	.....
Toronto, Sept. 19th, 1917	18.1	33.0	.24	0.58	0.54	nil	1.1
New Toronto	17.9	32.7	.022	0.40	0.05	6.4	.....
Toronto, Sept. 12th, 1917.....	17.9	32.9	.23	0.45	0.40	0.08	.028
Iroquois Falls.....	17.8	32.0	.286	0.58	0.57	0.24	.05
Orillia.....	17.7	37.9	.094	0.35	0.345	trace	.....
Stratford.....	17.7	38.3	.08	0.3	0.26	trace	.....
Lindsay (ground)	17.6	38.7	.06	0.495	.....	0.25	.....
Kitchener.....	17.5	39.8	.01	0.3	0.22	0.1	.....
Toronto, Sept. 27th, 1917	17.4	32.9	.21	0.45	0.43	0.23	.....
Toronto, July 10th, 1917	17.2	38.0	.059	0.3	0.27	trace	.....
Toronto.....	17.0	38.5	.035	0.3	0.21	0.1	.....
Toronto, Aug. 2nd, 1917.....	16.9	36.6	.089	0.45	0.42	0.1	.....
Weston (ground)	16.48	32.7	.14	0.01	0.005	0.16	.....
Niagara-on-the-Lake	15.8	37.2	.01	0.5	0.4	trace	.026
Weston (lump).....	14.0	33.2	free acid 1.1	0.04	0.03	0.12	.....
Dunnville.....	12.8	35.5	0.1	trace	trace	trace	4.5
Maximum of each part.....	19.5	43.3	.300 free acid	.58	.57	6.4	4.5
Minimum of each part....	12.8	32.0	1.1	trace	trace	nil	nil

NOTE.—Aluminium Sulphate should be judged and purchased on its water soluble aluminium content and on the excess of Al₂O₃H₄ over what is required theoretically to combine with sulphuric acid. Estimated on the basis of 17% Al₂O₃ at 2 cents per pound, an alum, 19.5% Al₂O₃, is worth ⅓ cent more, which is equivalent to a discount of 16½ per cent., and an alum 12.8% Al₂O₃ is worth ½ cent less and represents a loss of 25%. The 12.8% Al₂O₃ referred to was purchased at 5 cents per pound, and the loss was at least 1¼ cents per pound irrespective of the original high cost.

Lump alum or sulphate of alumina is a combination of bauxite—a southern clay containing 58 per cent. to 60 per cent. alumina, the aluminium being present as Al₂O₅H₄, with sulphuric acid.

The process most generally employed for manufacturing sulphate of alumina consists firstly in mixing bauxite with sulphuric acid in lead lined tanks, then boiling for a period of from six to eight hours. The solution formed after the reaction between bauxite and acid has taken place, is a mixture of Al₂(SO₄)₃ and silica; and in order to obtain a clear solution it is necessary to filter the mixture. This filtering process is difficult, tedious and costly. The alum solution is next boiled to expel the excess water. After being concentrated from a density of 25° or 30° Baume to a density of 50° or 60° Baume, the solution is discharged into trays, and on cooling it crystallizes to alum cake. This cake is then crushed or pulverized and is shipped in bulk, barrels or sacks.

A good basic aluminium sulphate should be in lumps from one-half to two inches in diameter. It should contain not less than 17 per cent. of water soluble aluminium calculated as Al_2O_3 , and should have a basicity ratio of 0.03 or, in other words, should contain one-half of one per cent. of Al_2O_3 more than is theoretically required to combine with the sulphuric acid present. It should not have more than one per cent. as total iron. An excess of bases over the amount required to combine with the total acid present is a necessity and is a point that is overlooked in the purchase of alum by most municipalities.

TABLE No. 2.
ESTIMATE OF THE PRESENT USE OF ALUM FOR WATER PURIFICATION IN ONTARIO.

Municipality	Pounds alum used per annum	Water gallons pumpage per annum	Water pumpage per 24 hours	Pounds alum used per 24 hours	Estimated grains alum per imp. gallon
Abitibi Pulp and Paper Mills, Iroquois Falls	14,400	94,900,000	260,000	40	1.1
Amherstburg (projected).....	.....	.....	750,000	106	1.0
Arnprior.....	300	146,000,000	400,000	52	1.5 (not in use)
Chatham.....	40,000	474,300,000	1,300,000	110	0.6
Cobourg.....	13,000	3,723,000	1,002,000	36	0.26
Dundas	17,155	117,530,000	322,000	47	1.1
Dunnville	6,000	182,500,000	500,000	15	0.2
Haileybury.....	45,000	73,000,000	200,000	125	4.4
Kitchener.....	14,600	361,250,000	312,000	40	0.9
Lindsay (under construc- tion).....	58,000	.....	1,152,000	160	1.0
New Toronto	64,000	.....	1,250,000	175	1.0 to 0.75
Niagara-on-the-Lake.....	3,400	73,000,000	200,000	9.5	0.33
Ojibway (projected)	50,000	.....	1,000,000	140	1.0
Orillia	45,600	200,750,000	700,000	125	1.38
Oshawa (in construction)..	22,800	159,610,533	438,000	62	1.0
Perth.....	18,000	200,000,000	500,000	50	0.7
Renfrew	9,660	371,500,000	1,017,882	26.5	0.35
St. Thomas	5,400	622,744,480	1,815,820	150	0.58
Stratford.....	25,000	372,700,000	10,204,640	69	0.49
Toronto.....	1,600,000	10,950,000,000	30,000,000	4,384	1.1
Weston	3,600	55,000,000	175,000	10	0.4

To insure quality in aluminium sulphate and to make an appreciable saving, the municipalities using chemical and filtering their water should combine with each other and either manufacture their own aluminium sulphate or purchase it by annual contract according to the proposed specifications from one of several manufacturers. Without introducing the economic aspects of the question, the benefits to be derived from this co-operation are most apparent when the municipalities realize that manufacturers can give them exactly what they require with possibly a reduction in the cost of manufacture, provided the quantities and dates of shipment are reasonably apparent in the *annual* contracts. Until such action is taken the purchasing agent for each municipality should be instructed, even when buying small quantities of aluminium sulphate, to secure one which fills the following specifications:

SPECIFICATIONS FOR FILTER ALUMINIUM SULPHATE.

The basic aluminium sulphate shall be in lumps from one-half to two inches in diameter and shall contain not less than 17 per cent. water soluble aluminium calculated as Al_2O_3 . It shall have one-half to one per cent. of Al_2O_3 in excess of the amount theoretically required to combine with the sulphuric acid present. It shall not contain more than seven to ten per cent. insoluble matter in cold water and not more than one per cent. total iron.

Provided that a proper grade of bauxite filling the required specifications for alum-making is used, manufacturers should not find it difficult to supply aluminium sulphate according to the above specifications.

In paper mills, or for other industries where the pure article is needed, it is essential to use a sulphate of alumina containing not more than one-tenth to one per cent. insoluble matter in cold distilled water. For water purification, however, a refined alum is not necessary, and, in fact, it is not nearly so active a coagulant as alum containing a fairly high percentage of insoluble matter.

Table No. 2 is an estimate of the present use of alum and the dosage administered in the several municipalities operating rapid sand filters. It is to be observed that quantities greater than 2.5 grains per gallon and less than 0.5 grains are either excessive and wasteful, promoting corrosion in water service pipes and fittings, or inadequate, permitting insufficiently treated water to pass through filters.

Table No. 3 is a rough forecast of the use of alum in the Province, mention being made only of the municipalities using alum at the present time. This table may be of interest to industries in a position to manufacture alum, or capable of supplying an equally satisfactory substance for the use of water purification plants. The number of municipalities employing rapid sand filtration should, in a few years, be considerably increased and the amount of alum used in the Province for water treatment will be about 1,500 tons per annum.

TABLE NO. 3.
FORECAST OF USE OF FILTER ALUM IN ONTARIO.

—	1916	1920	1925	1935
Estimated pounds of alum used.....	1,891,115	2,220,725	2,673,610	4,560,381

This decided increase in alum consumption, together with the problem of a suitable quality of alum at a nominal cost, makes it highly desirable to consider the practicability of manufacturing filter alums within the Province.

At the present time there is only one firm, to our knowledge, manufacturing alum in Canada. Most of the filter alum used in Ontario is imported either from Great Britain or the United States. A plant for making alum to coagulate water was recently built at the Columbus Water Purification Works, Ohio. According to *Charles P. Hoover this plant (1915) is a success both technically and economically, and between 800 and 1,000 tons of alum are manufactured per year. The cost of manufacture in 1915 was about \$10.50 per ton. For this process sulphuric acid of not less than 92 per cent. is used and a bauxite containing not less than 52 per cent. Al_2O_3 , and not more than 3 per cent. Fe_2O_3 . Bauxite can readily be secured, containing from 58 to 60 per cent. Al_2O_3 . The filter alum should contain at least

*Journal of American Waterworks Association, Dec., 1915.

17 per cent. Al_2O_3 , and one ton of bauxite will serve for at least three tons of alum, $\text{Al}_2(\text{SO}_4)_3 \cdot 14 \text{H}_2\text{O}$. The manufacture of alum in Ontario at the point where it is to be used would be of great economic advantage, especially in that it increases our local market for sulphuric acid wherever large quantities of filter alum are required, and this coincides very well with the points of manufacture of sulphuric acid; also there is a decided advantage in hauling less than one-third the tonnage over railways now known to have very congested traffic conditions. Alum made at some central water purification plant can readily be shipped to adjacent municipalities in a solid form.

The importation of bauxite would probably be from the Southern States of America where it is mined quite extensively. There is no record of any bauxite in Canada. The shales and clays of Ontario seldom give as high as 20 or 21 per cent. Al_2O_3 and except the ordinary process is to be changed, are not suitable for the manufacture of alum.

The laboratory services of the Board have been extended to include the making of analysis of filter alums, with the hope that the municipalities will take full advantage of this means of checking shipments.

DESIRABLE FEATURES FOR ALUM FEED APPARATUS IN WATER PURIFICATION PLANTS.

F. A. DALLYN, C.E. (TOR.).

Alum—aluminium sulphate—is used almost exclusively, for coagulation, in that type of water purification plant known as the rapid sand or mechanical filter.

There are many types of these rapid sand filters, but certain fundamental principles of design are the same, that is to say, the sand must be of sufficient coarseness to pass the water without great resistance, (that is, resistance greater than the equivalent of the loss of head of four feet), and a filtering media must be artificially introduced into the sand, in order to strain the sediment, turbidity, or organisms from the water as the case may be. The straining layer or filter matte, for these various functions, however, need not be quite the same.

Usually, in municipal water supplies the removal of the very finely suspended turbidity and of micro-organisms, including bacteria, is the essential duty of the plant, and the usual specifications for sand provides for an effective size, ranging from .43 millimeters to about .5 millimeters. Coarse sand filters of this type, without the use of an artificial filter matte, do not effectively remove either fine turbidity or bacteria. The exceptional case is when water contains considerable slime and organic matter, and it is then possible for the filter to take up a certain efficiency. In this way efficiencies as low as 30 to 40 per cent. have been observed without the introduction of an artificial filter matte. But operating efficiencies of 95 to 97 per cent. cannot, however, be obtained.

The function of the coagulant is to create a jelly-like surface on the sand grains. This builds up until it practically interlocks, and a film is created, descending into the filter possibly several inches, and held by cohesive force. The matte, without offering extreme resistance to the flow of water, serves to strain out matters held in suspension.

The film reaches its maximum efficiency in from four to eight hours, after the filter is put in operation. If the water contains considerable turbidity, the matte may become so tight, after ten hours, that the pressure of water—especially in the pressure plant type—may overcome the cohesive force of the coagulant and rupture the filtering layer. When this occurs large volumes of water, improperly strained, find access to the underdrains of the filter.

The whole operation of filtering depends upon the presence of an unruptured film in the filter. One of the main reasons for the preference, in municipal purification plants, towards the gravity type of mechanical filter, is because of the fact that extreme pressures do not tend to arise in ordinary filter operation, pressures such as would rupture the straining film and the film continues unbroken except a plant attendant mischievously pokes his filter with bars. The effect of the filtering layers plugging, in the gravity plants, is to offer more resistance to the passage of water and decrease the filter capacity. A constant rate of flow may be maintained within certain limits by interposing a balanced control valve. These valves maintain a constant rate of flow by gradually cutting out a back-pressure (that is, the back pressure is permitted to decrease as the discharge of the filter decreases).

The rapid sand and other mechanical filters are designed essentially for the removal of the turbidity and the whole underdrainage and sand washing system must permit of a successful washing operation being carried out. In back-washing the ordinary type, the sand strainers act like a set of orifices for regulating the pressure at the face of the sand and distribute evenly the upward flow. By regulating the velocity of the upward flow any turbidity or material deposited on the filter

may be lifted and carried to the wash water troughs, and the operation depends specially on the manner in which the aluminium hydrate is formed and held on the top of the sand and the ease with which it can be dislodged and washed away when the flow to the filter is reversed in the washing operation.

In Ontario we have twenty plants of the rapid sand type with several more in course of construction and others in contemplation. Most of the plants are of the pressure type. A few are of the gravity type with some examples of the drifting sand filters. And it is imperative that further attention should be given to the manner in which the alum is introduced into the water for the promotion of the requisite straining layers. For the purpose of discussion, apparatus for feeding alum may be grouped into three natural divisions: (1) Apparatus capable of feeding from 15 to 100 pounds of alum per day, (2) apparatus capable of feeding from 100 to 300 pounds of alum per day, and (3) apparatus capable of feeding from 300 and upwards pounds per day.

Where a municipality has considerable standpipe or reservoir capacity and operates its fire pumps on off-peak periods, to keep the standpipe full, Class 1 may emerge into Class 2 or Class 2 emerge into Class 3, because the whole of the dosage may be delivered within an interval of a few hours. When no standpipe or reservoir is used, and the pumps operate continuously day and night, the classes are much better defined and can be grouped as indicated.

1.

Difficulties of feed are most apparent when centrifugal pumps are used against the closed system, that is, a system without a standpipe for equalizing draft. In such systems the use of a venturi or other meter for determining pumpage is absolutely imperative not only for the determination of dosage of alum but for proper control of the administration of disinfectants, such as bleaching powder or liquid chlorine, which are now generally included with water treatment plants.

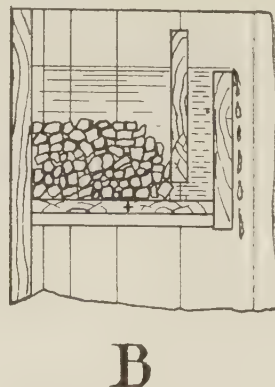
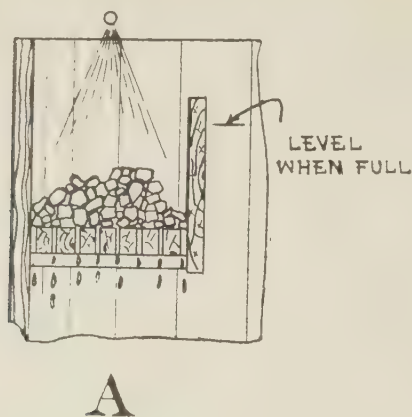
It may, therefore, be taken for granted that at each water purification works the rate of pumpage can be definitely known, and as far as possible wide variations within the hours of pumpage eliminated except in the case of fires.

Having in mind the results of filter operation both in Ontario and elsewhere there appears to be no great advantage in the minute control of the quantity of alum reaching the raw water, especially in Class 1, and in Classes 2 and 3 the control should only be such as would effect reasonable economy in the quantities of alum introduced.

The article by Miss G. E. Gallinger with reference to the solubility of alum, shows that with temperatures falling below 5° C., which are not at all uncommon in this Province, especially during winter, that a 5 per cent. solution cannot be readily realized except there be a long interval of contact or else the solutions be made with warm water.

In the older plants, and in some of the more recent ones, the proper weight of alum is measured out on scales, placed on a dissolving rack "A" and put into solution by a jet of water flowing over it and falling freely through a slotted base in to the storage tank, or else the measured quantity of alum is completely immersed as in arrangement "B." Both of these arrangements are perfectly satisfactory if the measured quantity of alum dissolves completely before the solution tank is quite full. Unfortunately, for quantities exceeding 30 or 40 pounds, this is not usually the case unless hot water is used.

In arrangement "A," the solving action for any residue may continue, because the specific gravity of the concentrated alum solution is much heavier than the solution in the tank and the heavy saturated solution may descend through the



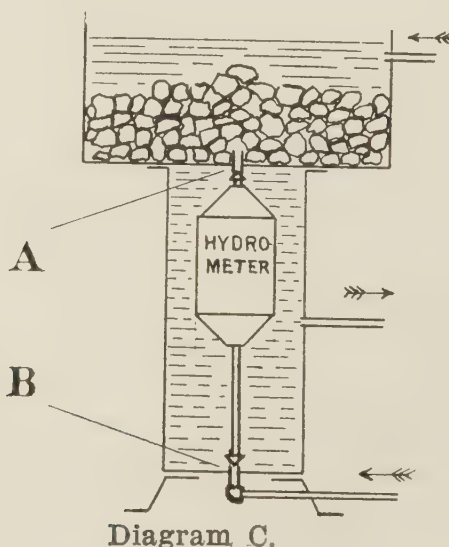
slots. In arrangement "B" there is no opportunity for any further solving action after the solution in the tank rises above the partition.

In any apparatus it must be recognized that alum dissolves very slowly in cold water. Some observations were made and they showed that not more than ten pounds out of fifty pounds immersed in water or exposed to a spray will normally dissolve in one hour at temperatures below 10°C .

If arrangements "A" and "B" are used without heating the water the valves must be very carefully set in order that the tank does not fill quickly. With "A" after the tank is full the solving action proceeds much slower than is the case when the water is being forced through the crystals.

To provide against trouble only hot water should be used with arrangements "A" and "B" and the flow regulated so that the tank does not fill before the alum is completely dissolved.

Mixing devices are not necessary if the solution tanks can be agitated by the water added finally to complete the proper quantity for the given weight of alum. The agitation is accomplished by carrying down a one-inch pipe to the bottom of the tank and terminating the down pipe with a 45° elbow about three inches above the bottom.



The Ver Mehr Engineering Company have an ingenious arrangement shown in diagram "C" and further commented upon on page 146. This arrangement makes use of a hydrometer which regulates the flow from the storage tank, containing a saturated solution of alum, and water taken from the supply main. A constant strength solution determined by the setting of the hydrometer can be delivered at the outlet of the balancing chamber. The apparatus is ingenious, and when the arrangement permits of large quantities of alum being placed in the

storage part of the apparatus it presents some very satisfactory features, especially when used to fill storage solution tanks. Its advantages are questionable for small direct feed arrangements since the strength of the solution will usually be above 3 per cent. and tends to corrode and clog the small orifices normally used.

The apparatus, however, has some very decided advantages and the cost as compared with the installation of hot water arrangements should determine whether it is economically advisable or not. *This apparatus may with advantage replace the old pressure type shown in Diagram "D."* The use of the old pressure type is always limited by the fact that the strength of a saturated alum solution varies with the temperature and with the particular grade of alum used.

Orifices for the pressure type of apparatus are arranged to pass very small quantities of solution per 24 hours, and the feed is forced through the apparatus first by interposing a resistance on the force main and then second by by-passing two leads to the apparatus, one before the resistance and one after. A difference of pressure on the opposite sides of the feed apparatus must be secured in order to cause movement. The disadvantages of the old type are apparent and little further need be said. The single advantage is that the solution feed is housed very simply and where an irregular dosage of alum it is of very little consequence, as in the case of treating water for a swimming pool, the old pressure type may be used.

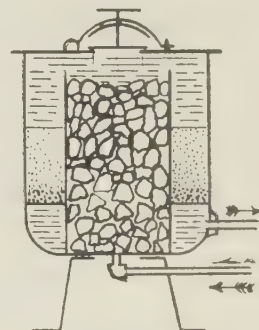
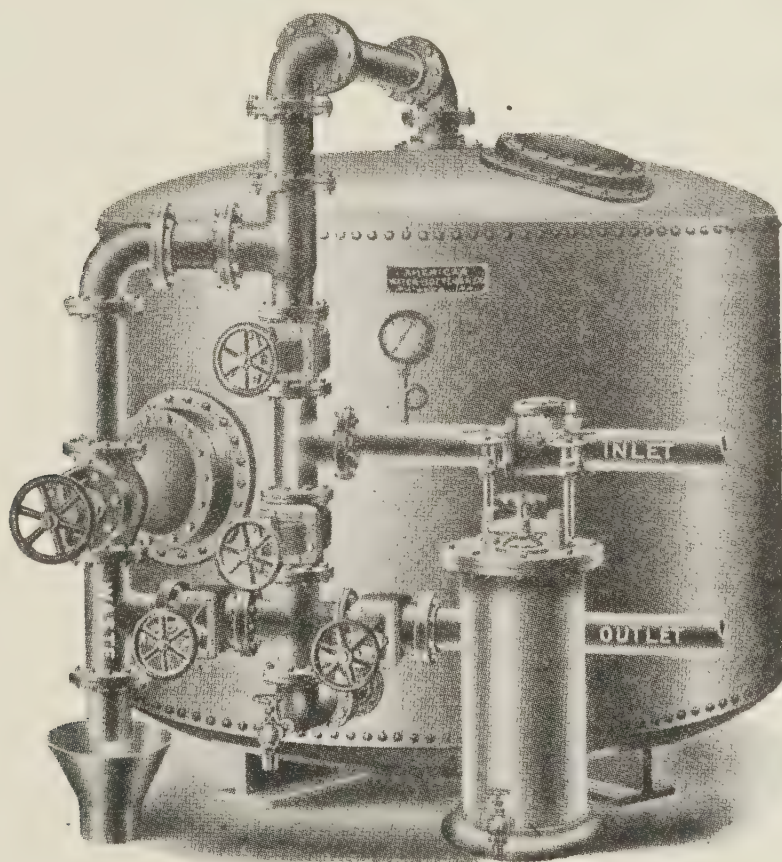


Diagram D.



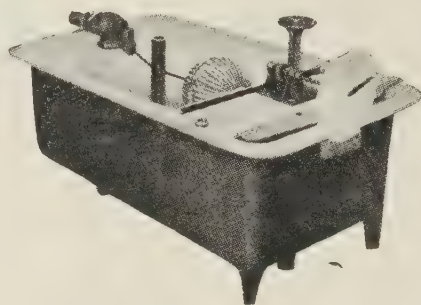
A common pressure type arrangement for hotels or hospitals

Hotels and hospitals frequently filter water taken from city mains and in such situations there is no opportunity for feeding into a low pressure point: apparatus similar to the old type or to that of the Ver Mehr Company are then required.

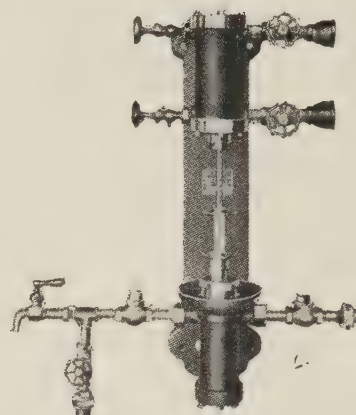
The equipment required for regulating the flow either to the suction of a pump or to the pump well is very simple. An orifice box is arranged as shown in



Orifice.



Orifice Box.



Chemical Pump.

the cut, with a slide closure type of orifice and a ball-cock float for maintaining a determined level. If the solution is to be fed to the pump suction a connection to the water main is interposed between the orifice feed and the pump in order that air will not be drawn through the feed line in case the orifice clogs. A water connection also permits the use of a larger pipe and does away with the need for small valve openings; the excess water fed in this case acts similar to the valve in restraining the flow of the solution.

Orifice boxes had better be purchased directly from one of the filter manufacturing companies who are supplying satisfactory equipment for this purpose. The orifice is usually operated with a head of about 6 inches. The head is always

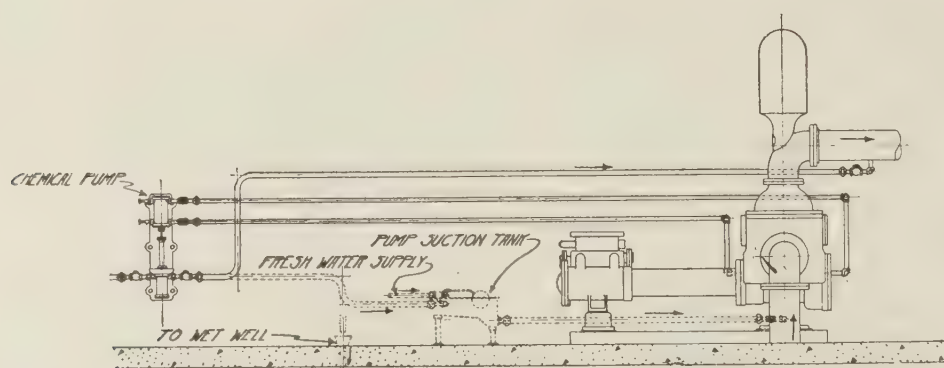


Diagram showing pump connections or connection to a wet well.

specified at the time the valve is calibrated. For ordinary operation the valve may be calibrated for the average pumpage during portions of the 24 hours. The pump attendant or person having control of the alum feed should make a practice of regulating the orifice valve at certain intervals without regard to the operation within these periods. This manner of operation in the smaller plants yields very satisfactory results, and there appears to be little advantage in installing expensive types of flow regulators actuated from venturi tubes or other measuring mechanisms in such cases.

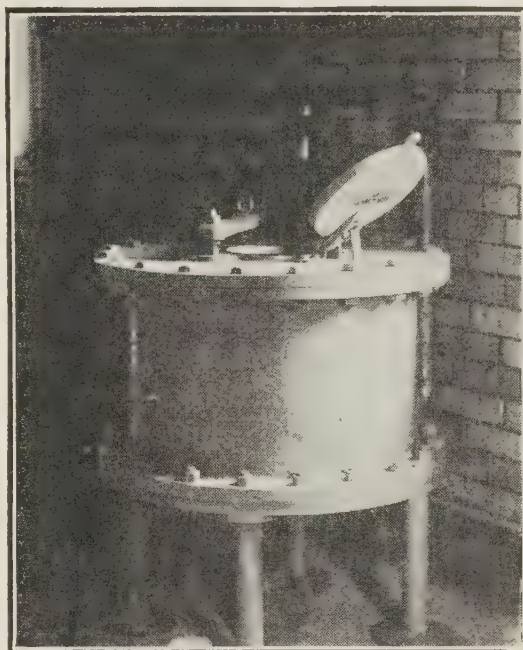
The solution tanks should not be less than 4 ft. 0 in. diam. and 3 ft. 6 in. deep when full. They should, except in special cases, be in duplicate, and the dissolving tray or compartment should have a capacity of not less than seventy-five pounds below the water level, when the perforated rack is used. The main thing for the medical officer of health to remember is that the solution must be of constant strength, and in order to get this without difficulty it is advisable to put in hot

water heaters. Hot water heaters are now on the market which use steam, gas or electricity as the heat element, so that there remains no situation where such apparatus cannot be immediately installed and the plant rearranged to take advantage of it.

For all installations, where it is proposed to use small orifices, a filter should be provided and the solution thus treated before it reaches the orifice. The apparatus in the cut filters the solution as it is elevated to the storage tanks. Where filters have not been thought of a small filter one foot square can usually be recessed in the bottom of the storage tank. Coarse sand or fine gravel is used and it is cleaned by back-washing in the same manner as the rapid sand filters.

2.

Practically all that has been said with respect to the first division is equally true here. The increased quantities of alum used, however, now permit of some new types of feed, the most common of which is the "Gauntt" dry feeder. Crushed alum is used and fed by an advancing worm to a dissolving drum or mixer. The water which puts the alum into solution is used to drive the machine (any rate of feed can be secured by gearing or through the use of cone pulleys) and to operate the paddles in the mixing drum. A "Pelton" water motor is generally used for these installations.



Apparatus at Lindsay for elevating alum or a solution to storage tanks.

The "Gauntt" dry feed apparatus and the "Pelton" water motor are both standard equipment and do not cost excessively. The apparatus can be housed in a small space in these installations. Careful consideration must be given to the dissolving drum or hopper. The alum falling into the drum or hopper, as the case may be, should go into solutions as fast as it is fed forward; that means the size of the drum and the rate of flow through it must be for the worst conditions that may arise, namely, (1) extreme low temperature in the water, (2) an alum whose solubility is below the average. The expense of heating the large amounts of water necessary to run the Pelton wheel exclude its use in the general arrangement. If it is used, power other than a water motor will usually be used.

3.

What has been said previously again applies. The smaller users in this grouping will lean towards the dry feed apparatus or Ver Mehr equipment and the larger users will most probably manufacture under one of the many processes, and in this latter case a solution will be fed through proportionate feed apparatus. The design of this apparatus is, however, in itself a special field of engineering and hardly comes within the province of this paper.

The new alum feed apparatus at Toronto Filtration Plant has many novel features and shows the advantages to which Hydrometer control may be put. A description of the Toronto plant follows:

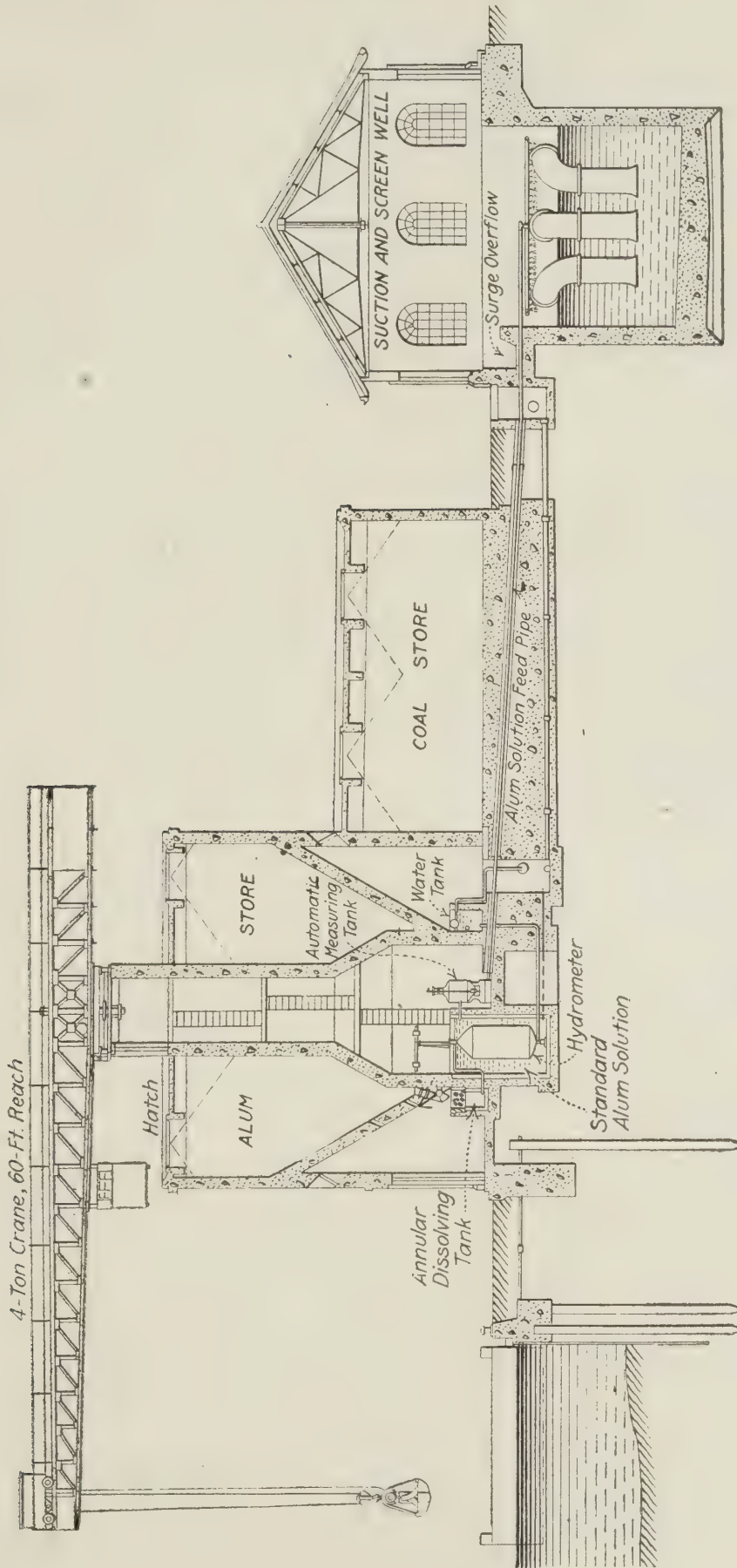
CITY OF TORONTO GRAVITY PLANT.

Description supplied by the John Ver Mehr Engineering Co.

In this case a chemical house and coal-storage are provided of reinforced concrete with a partial brick facade, and are arranged in one group of buildings 120 x 80 ft. in order that the facilities for unloading and loading materials from the wharf shall be common to both. Storage for 1,500 tons of coal and 800 tons of aluminium sulphate is provided.

The underlying idea is to allow the dry chemical to feed down automatically from the storage bin through a number of control doors to a tray at mid-level in a dissolving channel maintained full of water. The solution formed may be of any strength in excess of 5 per cent., and this solution is fed from the bottom of the dissolving channel into a dilution tank in which it is automatically diluted down to the standard 5 per cent. by a hydrometer-like arrangement. From this tank the standard solution is fed into a measuring tank controlled by a 72-in. Venturi raw-water meter through a combined electric and hydraulic relay. From the bottom of the measuring tank the solution gravitates through lead pipes to the pump suction well and is there distributed over the water to be treated. The apparatus is in duplicate. In the section some of the parts have been displaced in order better to illustrate their working. The annular dissolving channel tank is maintained full of filtered water by a float valve. From the water tank the water flows freely to the dissolving tank or channel and after dissolving the aluminium sulphate passes through a valve at the top of the hydrometer. At the same time the water also comes from the water tank to a valve at the bottom of the hydrometer.

The hydrometer is poised in the solution between the two valves. Any vertical movement of the hydrometer opens one valve and closes the other. Thus it will let in strong solutions at the top and water at the bottom until the balance is obtained, when the hydrometer just floats in a solution containing 5 per cent. of aluminium sulphate. Any change from this strength causes the hydrometer to move and close one valve and open the other. It should be remembered that a 5 per cent. solution of aluminium sulphate is about $2\frac{1}{2}$ per cent. heavier than water, and it is due to this fact that the apparatus works properly, not only from the point of view of supplying the energy to move the hydrometer, but also to mix the diluting water with the solution already in the chamber. The heavier liquid put in at the top tends to sink rapidly to the bottom, and on the other hand the lighter liquid fed in at the bottom tends to rise rapidly to the top; thus the liquid is maintained in a rapid state of circulation. A beam with knife-edges above the hydrometer provides for permanent adjustment and also for working with any desired density of solution. There is a scale with divisions for each 0.1 grain of coagulant per gallon of raw water, so that by simply moving a weight along a beam any desired amount of aluminium sulphate may be added to the water. The standard solution passes freely to the measuring tank and away to the suction well. For every rate of water passing through the raw-water meter there is a corresponding position for the hydraulic piston and gauging slot in the measuring tank. Each of these apparati is designed to dissolve and apply 12,000 lbs. of the solid chemical for 24 hours.

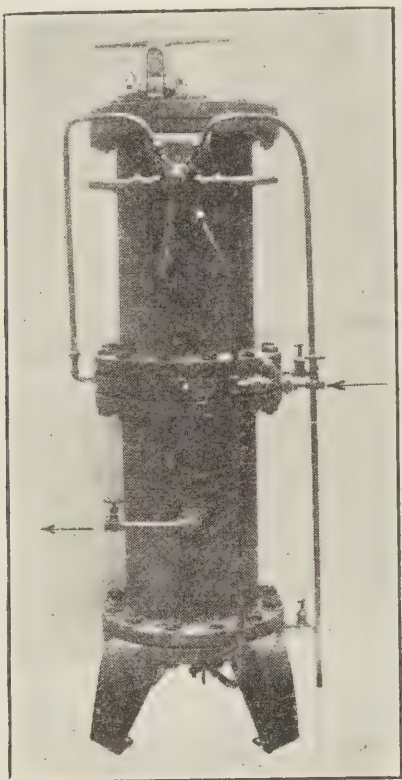


Alum Storage and Coagulant Feed Apparatus, City of Toronto Gravity Plant.

SMALL PRESSURE COAGULANT FEED APPARATUS.

Description supplied by the John Ver Mehr Engineering Co., Toronto, Ont.

This apparatus consists of a vertical cylinder divided into two portions of equal length. The upper length except near its bottom is unequally divided vertically, making it into a kind of U tube, in the larger leg of which is a perforated cylinder in which the solid chemicals are placed. The smaller leg serves to store solution displaced into it from the larger when charging in the solid chemical. This solution would otherwise be wasted. The upper cylinder is provided with a charging door and five-way charging cock. The lower cylinder contains the hydrometer with its needle valves at top and bottom and discharge orifice at its middle height. The inlet and outlet are connected respectively to the inlet and wedge block cavity of a gate valve on the water line. The valve is partially closed and its opening calibrated so that the loss of head produced is sufficient to draw definite quantities of coagulant through the orifice on the hydrometer cylinder for any given rate of passage of water through the valve, so that the apparatus is on a shunt to the water line and the quantities passing through it are proportional to the water passing as the same law of discharge applies to the orifice and gate valve opening.



The operation of this apparatus is as follows:—

1. To charge with sulphate of alumina, the charging five-way valve is set at charge; this by-passes the hydrometer cylinder direct to supply and releases the pressure from the upper dissolving cylinder, and the retort door can be opened. This allows water already stored in the smaller leg of the U tube to escape drawing down the solution in the larger leg, which can be replaced with the solid chemical. This proceeds until the charging is complete when the charging door is replaced and the charging lever switched over to work.

2. The whole apparatus is now under pressure again and in operation. The water drawn from in front of the partially closed gate valve is divided into two portions, one being in at the bottom of the hydrometer cylinder and the other to the top of the smaller leg of the dissolving cylinder, and ultimately down to the bottom and up past the solid chemical in the charging cylinder—becoming nearly saturated in so doing—and from thence to the top of the hydrometer cylinder. The action of the hydrometer in maintaining a solution of constant strength is the same as that described in the Toronto plant, but in this case there is no provision for a variable strength of solution which is permanently of 5 per cent. strength, and any change in the number of grains per gallon required must be made by adjusting the opening of the partially closed gate valve or by substituting other orifices. From the orifice the 5 per cent. solution passes into the water line at the wedge block cavity of the partially closed gate valve. This point is one in which the water is in a state of turbulence and rapid, thorough mixing takes place.

COMPILATION OF RECOMMENDED METHODS FOR THE PHYSICAL AND CHEMICAL EXAMINATION OF WATER AND SEWAGE.

By A. V. DELAPORTE, B.A.Sc.

Chemist in charge of the Provincial Board of Health Experimental Station.

INTRODUCTION.

The standardization of methods and technique employed in the chemical examination of water and sewage throughout the Province of Ontario is most important. Municipal consulting laboratories are becoming more numerous and each analyst examines the water and sewage by the methods taught in the particular school where he had his training. These methods vary widely in some tests. The results of the tests, for which the technique varies widely, are at best but of comparative value and it is most important that there should be a standard method for examination so that the results of analysis throughout the Province may be comparable, and any departure from the standard technique should be stated in reporting results.

To expedite the use of a standard technique in the various laboratories in the Province it is proposed in this paper to give the methods employed in the Experimental Station of the Provincial Board of Health of Ontario, and to outline briefly the reason why that particular method was chosen as against other optional or recommended methods.

The Standard Methods of Water Analyses of the American Public Health Association are used as a basis, and most of the methods outlined, in the following, will be found to have a common origin with the American Public Health Association methods, but with two or three notable exceptions.

In large laboratories engaged in the examination of water or sewage, such as those of the Board of Health, that method, where there is a choice of several methods of examination, which will give the most comparable results in a minimum of time, is the method proper to employ.

The "oxygen consumed from permanganate test" is a case in point. In the standard methods of water analyses of the American Public Health Association there are several methods mentioned: (1) Digestion in the water bath for thirty minutes; (2) boiling for two minutes; (3) boiling for five minutes; (4) standing at 20°C. for four hours. As the "oxygen consumed" is a test to determine the quantity of oxygen required to oxidize the organic matter in a sample, or, in other words, an indication of the amount of reducing organic matter in the sample, a most reasonable method is to add the permanganate solution and keep the sample at a temperature of from 18° to 20°C. for a period of hours. The interval of four hours at 20°C., as given in the above mentioned report, is not, however, a sufficient length of time, at that temperature, to measure the oxygen requirement. Laboratory experience has shown that it is impracticable to keep a number of daily samples

for long periods, and that it is possible to achieve practically the same result as would be obtained by prolonged digestion at low temperature by raising the temperature and shortening the period of digestion.

"Oxygen consumed" is at best but a comparative test and it is necessary in making comparisons that the samples should be tested in exactly the same manner, consequently the temperature must be raised to the same point in each and every analysis, and digestion continued for a defined length of time. Two temperatures are readily available for digestions of this nature and can be determined without the use of thermometers and automatic temperature regulating devices; the first is obtained by using a boiling water bath, the second by raising the temperature of the acidulated sample to its boiling point. Digestion on a water bath for thirty minutes gives splendid results and is the method recommended by the American Public Health Association, but similar results are secured by boiling the sample for five minutes. To show a comparison of the methods, raw sewage was filtered with aluminium cream until it was absolutely free from suspended matter. The filtered sample was then tested for "oxygen consumed" by several methods:

Digested for 30 minutes on boiling water bath.	Boiled for 5 minutes.	Boiled for 2 minutes.	English Method stand- ing at 20°C. for 4 hours.
3.7 c.c.	3.3 c.c.	1.6 c.c.	2.9 c.c.
3.3 c.c.	3.6 c.c.	1.7 c.c.	
3.5 c.c.	3.5 c.c.		

Results in cubic centimeters of a standard K Mn O₄ solution.

From the above table it will be seen that boiling for five minutes gives results almost identical with those obtained by digesting on the water bath for thirty minutes. It was therefore decided to recommend the five minute method, which is the method we now use in our laboratory.

TECHNIQUE USED FOR OXYGEN CONSUMED ON SEWAGE

The samples of sewage are arranged in proper sequence with a numbered casserole in front of each. The analyst puts 10 cc. of each sample into the casserole, and adds 90 cc. of a 2.5% solution of sulphuric acid from an automatic pipette. The acidulated sample is then placed on a special hot plate. Five samples are treated at a time. When the samples have come to a boil, No. 1 is lifted off and 12 cc. of the standard potassium permanganate solution is added from an automatic pipette and the sample replaced on a hot plate. The addition of the permanganate takes only a small fraction of a minute. One minute after No. 1 has been treated with permanganate solution No. 2 is treated; one minute after No. 2, No. 3, and so on until at the end of four minutes all five samples have been treated with the permanganate solution. One minute after No. 5 has had permanganate added No. 1 will have been boiling for five minutes. No. 1 is then removed and 10 cc. of a standard solution of ammonium oxalate is added from an automatic

pipette and No. 1 is replaced on the hot plate. The remaining samples are treated similarly at one minute intervals until nine minutes from the time the first permanganate solution is added the five samples, each of which has been boiling for five minutes with permanganate, are decoloured and ready for the final titration with the standard permanganate solution. This is proceeded with immediately. The next five samples are warming up while the first five are being titrated.

Three methods of dissolved oxygen have been tried: (1) Winkler's method; (2) a field method outlined by Mr. James Miller, F.I.C., in the Journal of the Society of Chemical Industry, February 28, 1914 (this is a modification of the method of Linossiers published in the Journal of the Society of Chemical Industry, 1891, page 726); and (3) a colorimetric method worked out by Mr. Lancaster and Mr. Bonham of the Provincial Board of Health, Ontario, which is a modification of a method outlined by Sir William Ramsay and Miss Homfray (Colorimetric Determination of Dissolved Oxygen), Journal, Society of Chemical Industry (1901), 20, 1071-4.

For determinative analysis the latter is undoubtedly the most accurate method yet outlined, but for turbid and coloured samples and for use in field work Miller's method is best. This being the case, Miller's method is the most suitable for general use and our technique for this method will be detailed later.

COLORIMETRIC STANDARDS FOR AMMONIA.

Permanent standards for ammonia are made up of an alkaline methyl orange solution instead of the platinum cobalt standards recommended by the American Public Health Association. They appear to be quite as satisfactory as the platinum standards. After standing for several months, however, a white solid may appear; this necessitates the renewal of the standards.

COLORIMETRIC STANDARDS FOR NITRITES

Permanent standards for nitrites are made up of solution of fuchsin, the desired bluish tone being secured by the addition of a solution of copper sulphate.

Nitrates.—If estimating nitrates in samples with a high chlorine content (by the phenol sulphonic method), make up standard, adding sufficient standard sodium chloride solution to make the chlorine content in the standard the same as in the sample. This renders the precipitation of the chlorine in the solution unnecessary and will give results sufficiently accurate for most purposes. Addition of Ammonium Hydroxide to the acid mixture instead of Potassium Hydroxide solution as recommended by the American Public Health Association, does away with the turbidity sometimes encountered in doing nitrates on sewage samples.

A. V. DELAPORTE.

METHODS FOR WATER AND SEWAGE ANALYSIS.

COLLECTION OF SAMPLES.

For the physical, chemical and microscopical examination of water, bottles should be glass stoppered and have a capacity of at least two litres. Before using, the bottle should be cleansed by treating with sulphuric acid and potassium bichromate, rinsing with distilled water until the rinse water shows on testing with Barium Chloride solution, no trace of sulphates, then draining. The stoppers and necks of the bottles should be protected from dirt by tying cloth, sheet rubber, tin foil or oiled paper over them.

The time that may be allowed to elapse between the examination of a sample and its collection depends on the character of the sample and on the examination to be made.

The maximum limits suggested by the American Public Health Association are satisfactory.

PHYSICAL AND CHEMICAL ANALYSIS.

	Hours.
Ground waters	72
Fairly pure surface waters	48
Polluted surface waters	12
Sewage effluents	6
Raw sewages	6

MICROSCOPICAL EXAMINATIONS.

	Hours.
Ground water	72
Fairly pure surface waters	24
Water containing fragile organisms. Immediate examination.	

BIOLOGICAL EXAMINATION.

	Hours.
Samples kept at less than 10 deg. C.	24

Samples for sanitary chemical examinations may be sterilized by the addition of chloroform, formaldehyde, mercuric chloride, which will permit of their being kept for longer periods than those indicated. The period of time elapsing between the collection of sample and its examination should be reported with the results.

Estimations of gases dissolved in samples, more especially oxygen, hydrogen sulphide and carbon dioxide must be at the time of collection of the sample in order to secure reasonable accuracy.

It is absolutely essential that the samples examined be truly representative, and it must not be forgotten that composite samples obtained by mixing amounts collected at frequent intervals over twenty-four hours may not indicate actual conditions but only an average which may be the result of wide variation.

ALUMINIUM CREAM.

This is used for clarification of samples in which colour or turbidity interferes with the determination of chloride, nitrites or nitrates.

Preparation.—Weigh out about 125 grams of potash or ammonium alum, dissolve in a small volume of distilled water, then dilute to about one litre in a large beaker. Add ammonium hydroxide until precipitation is complete; then wash by decantation until the wash water comes out free from nitrites and chlorides. Finally, make up to about a litre with distilled water, bottle and keep for use.

Application.—To apply this in clarification, rinse a 250 cc. flask with the sample, measure into it 200 cc. of the water to be examined, add 3 cc. aluminium cream, and shake vigorously. Allow to stand in a warm place for ten to fifteen minutes, then dilute to the mark with distilled water, and filter through a dry folded filter. Examine the filtrate in the ordinary way. Results must be multiplied by a factor to correct for the dilution.

TURBIDITY.

Use diatomaceous earth as free as possible from sponge spicules and amorphous silica. Wash with water to remove soluble salts; dry, and ignite to remove organic matter; treat and warm with dilute hydrochloric acid; wash with distilled water until free of acid, and dry thoroughly. Grind in an agate mortar, sifting through a No. 200 mesh sieve in order to separate mats obtained by grinding, and dry in a desiccator. One gram of this preparation in one litre of distilled water makes a stock suspension which contains 1,000 parts per 1,000,000 of silica, and which should have a turbidity of 1,000. Test this suspension, after diluting a portion of it with nine times its volume of distilled water, with a wire to ascertain if the silica has the necessary degree of fineness, and if the suspension has the necessary degree of turbidity. If not, correct by adding more silica or more water as the case demands. Standards for comparison shall be prepared from this stock suspension by dilution with distilled water. For turbidity readings below 20, standards of 0, 5, 10, 15 and 20 shall be kept in gallon bottles made of clear white glass; for readings above 20, standards of 20, 30, 40, 50, 60, 70, 80, 90 and 100 shall be kept in Nessler tubes, approximately twenty millimeters in diameter.

Comparison of the water under examination with standards shall be made by viewing them sidewise toward the light, looking at some object and noting the distinctness with which the margins of the object can be seen. The standards shall be kept stoppered, and both sample and standards shall be thoroughly shaken before making the comparisons.

In order to prevent any bacterial or algal growths from appearing in the standards, a small amount of bichloride of mercury may be added to them.

Notes:—

In readings higher than 100 use dilutions.

DETERMINATION OF COLOUR.

Solutions Required—

Platinum—Cobalt Standard.

Weigh out accurately 1.246 grams Potassium Platinic Chloride ($\text{PtCl}_4 \cdot 2\text{KCl}$) and 1 gram Cobalt Chloride ($\text{CoCl}_2 \cdot \text{H}_2\text{O}$), add 100 cc. concentrated hydrochloric acid, and dilute with distilled water to one litre in a standard flask. This solution has a colour of 500. By diluting various amounts of this solution with water to definite volumes in Nessler tubes, colours 0, 5, 10, 15—70 may be prepared. They are permanent if protected from dust.

Fill a Nessler tube to the graduation mark with the water to be examined to a depth equal to that of the standards. Compare with the standards by looking vertically downwards through the tubes upon a white surface placed at such an angle that the light is reflected upwards through the liquid. Dilute any samples having a colour greater than 70, before making the comparison.

The apparent colour is determined on the original sample without filtration. In the case of samples carrying suspended solids, the true colour is determined on the sample after filtration through paper, or if the suspended matter is fine, through a Berkefeld filter.

The results of colour determined shall be expressed in whole numbers and recorded.

Between	1—50	to the nearest	unit.
	51—100	"	5
	101—250	"	10
	251—500	"	20

The method used by the United States Geological Survey gives results in substantial agreement with those obtained by the Platinum Cobalt method and is recognized as a standard procedure.

Notes:—

DETERMINATION OF ODOUR.

(1) When Cold.—When the bottle containing the sample has been standing at room temperature for some time, is about half full, give it a thorough shaking, remove the stopper and smell the odour at the mouth of the bottle.

(2) When Hot.—Pour about 150 cc. of the sample into a tall 400 cc. beaker without lip. Cover with a well-fitting clock glass, place on the hot plate and heat until the water is just below boiling point. Remove the beaker from the plate and allow to cool for not more than five minutes. Then shake with a rotary movement, slip the cover glass to one side and smell the odour.

Expression of Results.

QUALITY OF ODOUR.

A—Aromatic.	m—Mouldy.
C—Free chlorine.	M—Musty.
d—Disagreeable.	P—Peaty.
e—Earthy.	s—Sweetish.
f—Fishy.	S—Hydrogen sulphide.
g—Grassy.	V—Vegetable.

The intensity of the odour is expressed by prefixing a numeral to the expression of quality.

Numerical Value.	Term.
0	None.
1	Very faint.
2	Faint.
3	Distinct.
4	Decided.
5	Very strong.

Notes:—

ESTIMATION OF NITROGEN.

A. As Ammonia. I. Free Ammonia.

Reagents Required.

(a) *Ammonia Free Water.*

When the tap water is ordinarily pure; ammonia free water may be prepared from it by fractionating the distillate from the large still. If about thirty litres of tap water are placed in the still and ten litres collected in jar, the next ten litres which come over are practically ammonia free, and are best collected in glass stoppered bottles. Always apply test on 50 cc. with Nessler's reagent to make sure that no colouration is formed.

If for any reason the tap water carries an abnormal amount of organic matter it may be quite impossible to get ammonia free water in this way. In such cases a double distillation is necessary. Collect 5-10 litres of the best water from the still. Place it in a large round-bottom flask, add a few beads to prevent bumping and about 100 cc. of ammonia free sodium carbonate solution. Connect with glass condenser and distill again. After about one litre has passed over, test the distillate with Nessler's reagent, and if not free from ammonia continue the distillation and test again for ammonia. As soon as it is found to be ammonia free collect in the bottles prepared for the ammonia free water. Discontinue the distillation before the liquid in the flask has nearly boiled off.

(b) *Ignited Pumice to Prevent Bumping.*

Coarsely granular pumice may be ignited at red heat 5-10 minutes and then allowed to cool and placed in glass stoppered bottle. Avoid handling.

(c) *Nessler's Reagent.*

PREPARATION.

- (a) Dissolve about 125 grams of potassium iodide crystals in 500 c.c. distilled water.
- (b) Prepare a solution of mercuric chloride, saturated at ordinary temperature.
- (c) Weigh out approximately 300 grams stick potash and dissolve in a small volume of water in a porcelain dish.

Reserve 20 cc. A, and to the remainder add B gradually, with constant stirring until a faint but permanent precipitate is formed. Then add the 20 cc. A, and again add B carefully, drop by drop, with constant stirring until a faint red opalescence persists. Add C gradually, then dilute the whole to two litres. Allow to settle and draw off the clear liquid into a small bottle for use as required.

(d) *Ammonia Free Sodium Carbonate Solution.*

Weigh out approximately 100 grams sodium carbonate, dissolve in one litre distilled water, and boil the solution until 3 cc. of it diluted to 50 cc. with ammonia free water give no reaction with Nessler's reagent. Cool and bottle.

(e) *Ammonium Chloride. (Standard Solution.)*

Weigh out accurately 3.82 grams of pure ammonium chloride, dissolve in distilled water and dilute to one litre. Mix thoroughly, then withdraw 10 cc. of this solution by means of a pipette, and dilute to one litre with distilled water preferably ammonia free.

1 cc. equivalent to 0.01 mg. nitrogen.

Analysis.

Thoroughly cleanse still.- Rinse the flask with a few cubic centimeters HCl, then three times with tap water and three times with distilled water. Measure out about 500 cc. of distilled water (preferably ammonia free), transfer to flask, add two or three pieces of pumice, about 2 cc. ammonia free sodium carbonate solution, connect with the condenser and light the burner. Allow about 200 cc. to distill over. Then collect 50 cc. in Nessler tube and test with Nessler's reagent to make sure no ammonia is passing over. In Nesslerizing use plenty of rinse water for the tubes (if they have been standing rinse with HCl), followed by three rinsings of distilled and one of ammonia free water. Add about 2 cc. of Nessler's each time by means of a dip pipette and allow to stand five minutes before taking reading. Avoid touching with the rim of Nessler.

When the distillate has been found ammonia free, disconnect the flask and add 500 cc. of water sample (use standard flask to measure), reconnect the flask with condenser and continue the distillation, adjusting the burner so that 30 cc. of distillate pass over it in fifteen minutes. Collect four 50 cc. Nessler tubes and Nesslerize. The readings to be recorded as free ammonia, turn off the burner.

2. ALBUMINOID AMMONIA.

ADDITIONAL REAGENT. *Preparation of Alkaline Permanganate Solution.*

Employ two 2-litre Erlenmeyer flasks, using each to make up one litre of solution, performing the following operations in duplicate.

Weigh out approximately 200 g. stick potash and eight grams crystallized potassium permanganate. Pour into the flask one litre of distilled water, and mark the level of the liquid with a blue pencil. Add 250 cc. distilled water and again mark the level reached by the water. Add the 200 g. potash cautiously, inclining the flask and sliding the sticks down the side. Shake the flask gently until the potash is all dissolved, then add the permanganate and boil briskly over a thin gauze, until the volume diminishes to 1,000 cc. Allow to cool and bottle. Use 30 cc. for each determination of albuminoid ammonia.

When distilling off the free ammonia for the above determination, prepare the solution of alkaline permanganate for addition to the distillation flask. Thoroughly cleanse a 400 cc. Erlenmeyer flask and measure into it 150 cc. ammonia free water. Add 25 cc. alkaline permanganate solution and boil briskly while the determination of free ammonia is being made. Add the contents of the Erlenmeyer flask to the distillation flask while still hot and distill over four more Nessler (50 cc.) tubes.

Nesslerize and record readings as albuminoid ammonia.

Standards.

The standard solution of ammonia chloride employed for comparison contains 0.01 mg. nitrogen per cubic centimeter. As the intensity of the colour produced by Nessler's reagent reaches maximum in about five minutes after reagent is added and remains practically constant for twelve hours, a set of standards may be made up for each day's work. In case the permanent standards recommended by the American Public Health Association are made from a solution of Cobalt chloride and potassium platonic chloride, they should be checked up by the standard ammonium chloride solution for each batch of Nessler, by each individual using them.

CALCULATION OF RESULTS IN P.P.M.

A Typical Calculation.

Laboratory No.	Free Ammonia using 500 c.c. water.
First tube	2.5
Second "	1.75
Third "	1.
Fourth "	0.
<hr/>	
5.25 x 0.02=parts per million.	

Albuminoid ammonia is calculated in the same way.

SEWAGE.

For sewage the method in general is very much the same. It is necessary to use a smaller amount of sample; ordinarily 10 cc. is sufficient.

In charging the distillation flask for the cleansing of the still, use 720 cc. distilled water, 2 cc. of ammonium carbonate solution and a few pieces ignited pumice. This will ordinarily leave a sufficient amount of ammonia free water in the still to dilute the sewage to a volume great enough to supply 400 cc. distillate. If it is found that less than 500 cc. of water remain in the flask when sample is added, the contents may be diluted to approximately that amount with ammonia free water.

Notes:—

B. ESTIMATION OF NITROGEN AS NITRITES.

Solutions Required.

(a) *Sulphanilic Acid.*

Weigh out approximately 1.65 grams sulphanilic acid, transfer to a beaker, add 375 cc. distilled water and heat until the crystals are dissolved. Cool and add 125 cc. acetic acid (95%).

(b) *Alpha Naphthylamine Acetate.*

Weigh out about 0.25 grams alpha naphthylamine, transfer to a 200 cc. Erlenmeyer flask, add 50 cc. distilled water and boil in the fume cupboard for about five minutes, adding water as required to replace loss by evaporation. Filter through washed absorbent cotton. To the filtrate add 125 cc. acetic acid (95%), and dilute to 500 cc. with distilled water.

(c) *Standard Solution of Sodium Nitrite.*

1. If sodium nitrite can be obtained in a fair degree of purity, dry some of the salt by heating on a watch glass to constant weight in a steam oven. Weigh out accurately 0.246 grams of the dry salt, dissolve in distilled water to 500 cc. This solution contains 0.1 mg. nitrogen per cubic centimeter and will keep best in a cool, dark place. For use withdraw 10 cc. of the above solution (c. 1).

2. By means of a pipette, transfer to a litre flask, dilute to the graduation mark with distilled water.

1 cc. = 0.001 mg. nitrogen.

If the sodium nitrite in stock is known to be impure, prepare pure silver nitrite by adding silver nitrite solution to a concentrated solution of potassium nitrite, and allowing the silver nitrite which is sparingly soluble, to crystallize out. Recrystallize from aqueous solution, dry rapidly on paper and preserve in a brown kettle.

Weigh out accurately 0.22 grams of this silver nitrite, dissolve in distilled water, add sufficient dilute solution of pure sodium chloride to precipitate the silver completely. Mix until homogenous, transfer to a 200 cc. flask and dilute to the graduation mark with distilled water. Allow the precipitate to settle, then pipette out 10 cc. of the clear solution and dilute with distilled water to one litre.

1 cc. = 0.001 mg. nitrogen.

Analysis.

Rinse a 100 cc. Nessler tube with some of the sample, then fill to the graduation mark with the water to be examined. Add 2 cc. alpha naphthylamine acetate solution, 2 cc. sulphanilic acid solution and allow to stand ten minutes. Match the colour produced in similar tubes with distilled water, same amounts of reagents, and known quantities of the sodium nitrite solution added from burette. If the sample is turbid or coloured, clarify with aluminium cream. Nitrites are present in the air of a room in which gas is burning. If such a laboratory is used do not allow the tube to stand more than thirty minutes after adding the reagent.

C. ESTIMATION OF NITROGEN AS NITRATES.

Solutions required.

(a) *Standard solution of potassium nitrate.*

Weigh out accurately 0.720 grams pure potassium nitrate. Dissolve in a small tube of water, then dilute to one litre with distilled water.

(b) *Phenol-disulphonic acid.*

Weigh out about 15 grams pure phenol, transfer to a 200 c.c. Erlenmeyer flask, add 100 c.c. pure concentrated sulphuric acid and heat on the water bath for six hours.

(c) *Colorimetric standard solution.*

By means of a pipette, measure out 10 c.c. of the standard solution of potassium nitrate, (solution 1 above), evaporate to dryness in a small porcelain dish, moisten quickly and thoroughly with 2 c.c. of the phenol-disulphonic acid solution and dilute to one litre with distilled water.

1 c.c. of the solution \doteq 0.001 mg. nitrogen.

Analysis.

If the sample is coloured or shows turbidity, clarify with aluminium cream. Clear, colourless samples may be examined without preliminary treatment. By means of a pipette, measure out 10 c.c. sample into a 3-inch evaporating dish, and heat on the water bath until only a few drops remain, then set aside and allow the remainder to evaporate spontaneously.

Add six drops of phenol-disulphonic acid directly upon the dry residue, and stir with a glass rod to mix thoroughly. Dilute with about 10 c.c. distilled water, then add 10 c.c. ammonium hydroxide. Rinse the solution into a 50 c.c. Nessler tube, and dilute to the graduation mark with distilled water.

Match the colour produced in similar tubes by adding from a burette, various amounts to the standard colorimetric solution (3) to distilled water made alkaline with ammonium hydroxide. Chlorides interfere with the accuracy of the method, but not seriously, unless the chlorine is greater than 20 parts per million.

In examining samples high in chlorides, add to the standard solution of potassium nitrate, the amount of standard solution of sodium chloride required to increase the chloride content to equal that of the sample.

If pure silver sulphate free from nitrates is obtainable it may be employed to precipitate the chlorine. Pipette out 10 c.c. of the sample and add N/50 sulphuric acid to not quite neutralize the alkalinity (determined previously as temporary hardness by titration with lacmoid as indicator). Add sufficient silver sulphate solution (4.3969 grams per litre; 1 c.c. = 1 mg.) to precipitate the chlorides. Heat to boiling, add a little aluminium cream, allow to settle and filter while hot. Wash with small amounts of hot distilled water. Examine the filtrate in the ordinary way.

ORGANIC NITROGEN.

Procedure for Water: Boil 500 cc. of the sample in a round-bottomed flask to remove ammonia nitrogen. This usually causes the loss of 200 cc. of the sample, which may be collected for the determination of ammonia nitrogen. Add 5 cc. of nitrogen-free concentrated sulphuric acid and a small piece of ignited pumice. Mix by shaking and place over a flame under a hood. Digest until copious fumes of sulphuric acid are given off and the liquid finally becomes colorless or pale straw color. Remove from the flame, and add potassium permanganate crystals in small portions until a heavy green precipitate persists in the liquid. Cool. Dilute to about 300 cc. with ammonia-free water. Make alkaline with 10 per cent. ammonia-free sodium hydroxide. Distill the ammonia, collect the distillate in Nessler tubes, Nesslerize, and compare with standards as described for the estimation of Ammoniacal Nitrogen.

Procedure for Sewage: Distill the ammonia nitrogen directly from 100 cc. or less of the sample, diluted to 500 cc. with nitrogen-free water. Collect the distillate and determine the ammonia nitrogen in it. Add 5 cc. of nitrogen-free sulphuric acid and 1 cc. of 10 per cent. nitrogen-free copper sulphate, and digest the liquid for half an hour after it has become colorless or pale straw color. Add 5.0 gram of potassium permanganate crystals to the hot acid solution, and dilute to 500 cc. with ammonia-free water. Dilute 10 cc. or more of this liquid, in a Kjeldahl distilling flask, to about 300 cc. with ammonia-free water. Make alkaline with 10 per cent. sodium hydroxide, distill, and Nesslerize. With some samples direct Nesslerization may be used.

In this determination care must be taken to digest thoroughly, to add potassium permanganate to the point of precipitation, to sample carefully after dilution, and to add enough sodium hydroxide to insure the separation of the ammonia from the precipitated manganese hydroxide. Potassium permanganate should not be added during digestion because it causes loss of nitrogen.

TOTAL NITROGEN.

The total nitrogen is calculated by adding together the Organic, nitrite, nitrate and ammonia nitrogen.

Notes:—

TOTAL RESIDUE.

Evaporate 100 cc. of the thoroughly shaken sample in a tared platinum dish on a water bath. Dry the dish in a drying oven at 103°C. for one hour. Cool in a desiccator and weigh. Multiply the weight of the residue in milligrams by ten to secure the result in parts per million.

FIXED RESIDUE AND LOSS ON IGNITION.

Ignite the above residue in the platinum dish at dull red heat, until the residue is white or nearly so. Cool and just moisten with water. Dry the residue in an oven as for total solids and weigh. Record the weight of the final residue as fixed solids and the difference between the weight of the fixed solids and total solids is recorded as loss on ignition.

SUSPENDED SOLIDS.

The difference between the total solids in filtered and unfiltered portions of the sample is used as a basis for calculating suspended matter.

Notes:—

OXYGEN CONSUMED.

Reagents required.

(a) *Dilute Sulphuric Acid.*

One part strong acid to three parts distilled water, 10 cc. approximately used in each titration.

(b) *Solution of Ammonium Oxalate.*

0.888 grams crystals dissolved in small amount of distilled water, and the solution made up to one litre. 1 cc. is equivalent to 0.1 mg. of oxygen.

(c) *Standard Solution of Potassium Permanganate.*

0.3952 g. of the salt, dissolved in small vol. distilled water, then made up to 1 litre. 1 cc. = 0.1 mg. available oxygen.

Analysis.

Measure 100 cc. of the water sample (10 cc.-50 cc. in case of sewage) into a porcelain dish by means of a pipette, add 10 cc. of sulphuric acid solution, and in case of sewage dilute to 100 cc. Heat to boiling, read permanganate burette, then add 12 cc. of the standard permanganate solution. Raise the burette from the steam, and continue to heat the dish over the open flame. At the end of five minutes, remove the flame, add 10 cc. ammonium oxalate solution by means of a pipette, and then add permanganate gradually, until a permanent pink coloration appears. Read the burette.

The permanganate solution is used up by

- (1) The organic impurities in the sample.
- (2) The ammonium oxalate added.

Make a "blank" determination, using 100 cc. distilled water instead of the sample in the above. The amount of permanganate required in this will represent the amount equivalent to the 10 cc. ammonium oxalate under the conditions of time, temperature and concentration observed in the process.

The difference between the two amounts of permanganate will represent the amount consumed by the organic impurities in the sample. Certain other materials, such as hydrogen sulphide, nitrites and chlorides affect the result, but not seriously except when present in large amounts, and may be disregarded unless for special reasons extreme accuracy is desired.

DISSOLVED OXYGEN—"MILLER'S METHOD."

Reagents.

(a) *Methylene Blue Solution*—1 gram of methylene blue is dissolved on 1000 cc. of distilled water.

(b) *Ferrous Ammonium Sulphate Solution*—0.3103 grams of ferrous ammonium sulphate and 1 cc. concentrated sulphuric acid made up to 100 cc.

(c) *Alkaline Tartrate Solution*—60 grams of caustic soda and 173 grams of sodium potassium tartrate (Rochelle salt) dissolved in 500 cc. of water.

Analysis—50 cc. of the sample to be tested are pipetted into 100 cc. Nessler tube—being introduced below a covering layer of paraffin oil; 5 cc. of solution (c) and 1 drop of solution (a) are then added. Then from a 10 cc. graduated pipette solution (b) is run just below the surface of the liquid, stirring gently with a pipette until the colour is just discharged. The pipette reading gives the number of cubic centimetres of oxygen per litre.

Theoretically 1 cc. of (b) does not equal 1 cc. of oxygen per litre working on 50 cc. of the sample, but the above strength gives approximately correct results.

Miller says: "Each laboratory worker should test his ferrous sulphate against water of known oxygen content, say distilled water shaken with air until saturated, taking the temperature and referring to Roswe & Lint's table (Sutton's volumetric analysis, page 260) for the amount of dissolved oxygen present."

Notes:—

DETERMINATION OF HARDNESS.

Temporary Hardness.

Standard solutions required:—

(a) *Lacmoid solution for indicator.*

Dissolve one-half gram of lacmoid, in 500 cc. of 50 per cent. alcohol. Keep in bottle with dropping tube inserted through the cork.

(b) *N/50 sulphuric acid solution.*

Dilute 20 cc. of normal solution of sulphuric acid measured by means of a burette or calibrated pipette to 1 litre with distilled water. The normal sulphuric acid is best prepared by diluting concentrated sulphuric acid to the approximate strength standardizing by precipitation with barium chloride and weighing the barium sulphate obtained. From the results of this approximate standardization the amount of water necessary to add in order to bring the solution to exactly normal strength may be calculated.

Analysis.

For the determination of temporary hardness of a water sample, measure out 100 cc. by means of a pipette, transfer to a porcelain dish or casserole, add $\frac{1}{2}$ cc. of lacmoid solution and run in N/50 sulphuric acid solution from a burette until the blue colour has changed to a reddish purple, then heat rapidly to incipient boiling, remove the flame and continue the addition of the standard acid until a drop added causes no change in the reddish purple colour of the solution.

From the amount of sulphuric acid used calculate the temporary hardness of the sample. One cc. of N/50 sulphuric acid is equivalent to one milligram of calcium carbonate.

Total Hardness (soap consuming power).

This determination must be carried out at 20° C.

Solutions required: .

(a) *Standard solution of calcium chloride.*

Weigh out accurately 1 gram of C.P. calcium carbonate, transfer to a porcelain dish, cover with a clock glass and add gradually through the lip of the dish dilute hydrochloric acid in sufficient quantity to dissolve the carbonate. Remove cover glass, rinse with distilled water, and evaporate to dryness on a water-bath. Add about 25 cc. of distilled water and evaporate once more, then dilute to one litre with distilled water. Each cc. of this solution is equivalent to one milligram of calcium carbonate.

(b) *Standard soap solution.*

Scrape about ten grams of shavings from a bar of pure white castile soap, dissolve them in one litre of approximately 60 per cent. alcohol. If not clear, filter through paper.

Standardization of the Soap Solution—Measure out by means of a pipette 10 cc. of the standard calcium chloride solution, transfer to a 150 cc. glass-stoppered bottle and add 90 cc. of distilled water. Add gradually from a burette the standard soap solution until a permanent flame is obtained upon shaking. At first the soap solution must not be added in quantities greater than 1 cc. After each addition shake for a quarter of a minute and place the bottle on its side until the lather formed has broken. Towards the end of the titration do not add more than 1/10 of a cc. of the soap solution each addition, and the end point is taken as the point at which a permanent lather persists for five minutes with the bottle lying on its side. From the result of the titration, calculate the amount of calcium carbonate equivalent to 1 cc. of the standard soap solution.

In doing this it is necessary to allow for the soap consumed by the distilled water. Make a blank determination the same as the above, only using 100 cc. of distilled water with no calcium chloride solution. Deduct the amount required from that previously determined in the standardization.

Analysis.

If the determination of temporary hardness has shown the water to contain much calcium carbonate (more than 200 parts per million) measure out 50 cc. of the sample, transfer to the glass-stoppered bottle, dilute with 50 cc. distilled water and add standard soap solution gradually, shaking after each addition until a lather is formed which persists for five minutes. Deduct from the amount of soap solution used the quantity equivalent to the 50 cc. of distilled water. Express the results in parts of calcium carbonate per million. If the water does not appear to be very hard in the titration with N/50 sulphuric acid, use 100 cc. of the sample in the titration with standard soap solution.

ALKALINITY.

Reagents:

(a) *N/50 sulphuric acid.*

(b) *Phenolphthalein*—0.5 grams in 50 per cent. alcohol. Neutralize with *N/50 KOH* solution. Dilute the alcohol with boiled distilled water.

(c) *Methyl Orange*—Dissolve 0.5 grams in a litre of distilled water, keep in the dark.

(d) *Lacmoid*—Dissolve 2.0 grams of lacmoid in 1 litre of 50 per cent. alcohol as for phenolphthalein.

(e) *Erythrosine*—Dissolve 0.5 grams of erythrosine (sodium salt) in a litre of freshly-boiled distilled water.

PHENOLPHTHALEIN.

Add 4 drops of phenolphthalein indicator to 50 cc. or 100 cc. of the sample in a white porcelain casserole or an Erlenmeyer flask over a white surface. If the solution becomes coloured, hydroxide or normal carbonate is present. Titrate with *N/50 H₂SO₄*. The phenolphthalein alkalinity in parts per million of *CaCO₃* is equal to the number of cc. of *N/50 H₂SO₄* used, multiplied by 20 if 50 cc. of the sample was used or by 10 if 100 cc. was used. This alkalinity is due to hydroxides and normal carbonate.

PROCEDURE WITH METHYL ORANGE.

Proceed with titration as before, using two drops of methyl orange indicator. Calculate the methyl orange alkalinity in the same manner as the phenolphthalein alkalinity. This is due to normal carbonate and bicarbonate alkalinity.

LACMOID.

Add four drops of lacmoid and proceed as before until within 1 or 2 cc. of the amount necessary for neutralization has been added. Warm the solution until it just begins to boil and then continue the titration until a drop of the acid striking the surface of the liquid produces no change in the uniform reddish or purple colour of the solution. Calculate as before.

ERYTHROSINE.

Add 5 cc. of neutral chloroform and 1 cc. of erythrosine to 50 or 100 cc. of the sample in a 250 cc. clear glass-stoppered bottle. If the chloroform becomes rose coloured on shaking, hydroxide, bicarbonate or normal carbonate is present. Add *N/50 sulphuric acid* from a burette until chloroform is colourless. Calculate as before.

CALCULATION FOR BICARBONATE.

Bicarbonate is present if the alkalinity to phenolphthalein is less than half the alkalinity to methyl orange, erythrosine, or lacmoid. The alkalinity to methyl orange, erythrosine, or lacmoid is due entirely to bicarbonate, if there is no phenolphthalein alkalinity. If there is phenolphthalein alkalinity, the bicarbonate, in terms of CaCO_3 is equal to methyl orange, erythrosine or lacmoid alkalinity minus twice phenolphthalein alkalinity. Bicarbonate (HCO_3) = 1.22 times the bicarbonate expressed in terms of CaCO_3 . Carbon dioxide = 0.88 times bicarbonate expressed as CaCO_3 . Half bound carbon dioxide = 0.44 time bicarbonate expressed as CaCO_3 .

CALCULATION FOR NORMAL CARBONATE.

Normal carbonate is present if the alkalinity to phenolphthalein is greater than zero but less than the alkalinity to methyl orange, erythrosine or lacmoid. If the phenolphthalein alkalinity is exactly equal to half methyl orange, erythrosine or lacmoid, the alkalinity is due entirely to normal carbonate. If phenolphthalein alkalinity is less than half methyl orange, erythrosine, or lacmoid alkalinity, normal carbonate expressed in terms of CaCO_3 is equal to twice phenolphthalein alkalinity. If phenolphthalein alkalinity is greater than half methyl orange, erythrosine or lacmoid alkalinity normal carbonate equals twice the difference between methyl orange, erythrosine or lacmoid alkalinity and the phenolphthalein alkalinity.

Carbonate (Co_3) = 0.6 times the normal carbonate expressed as CaCO_3 .

Bound Carbon dioxide = sum of Carbon dioxide as carbonate and one-half Carbon dioxide as bicarbonate.

CALCULATION FOR HYDROXIDE.

If hydroxide is present the alkalinity to phenolphthalein is greater than one-half alkalinity to methyl orange, erythrosine or lacmoid. Alkalinity is due entirely to hydroxide if phenolphthalein alkalinity is equal to methyl orange, erythrosine, or lacmoid alkalinity.

If phenolphthalein alkalinity is more than one-half and less than all methyl orange, erythrosine or lacmoid alkalinity, hydroxide expressed in terms of CaCO_3 , is equal to twice the phenolphthalein alkalinity minus the methyl orange, erythrosine, or lacmoid alkalinity.

ALKALI CARBONATES.

Determine total alkalinity by titration with N/50 sulphuric acid, using methyl orange, erythrosine, or lacmoid as indicator. Then determine calcium and magnesium content, and subtract from total alkalinity the computed alkalinity due to calcium and magnesium expressed in terms of CaCO_3 . The remainder is alkalinity due to carbonates and bicarbonates of sodium and potassium.

ACIDITY.

Reagents.

(a) *N/50 sodium carbonate.*

Dissolve 1.06 grams of anhydrous sodium carbonate in 1 litre of boiled distilled water that has been cooled in atmosphere free from Carbon dioxide.

Preserve the solution in resistant glass bottles protected from air by tubes filled with soda lime.

1 c.c. is equivalent to 1.0 mg. CaCO_3 .

(b) *N/22 sodium carbonate.*

Dissolve 2.41 grams of anhydrous sodium carbonate in 1 litre boiled distilled water as in (1).

1 c.c. = 1mg. CaCO_3 .

(c) *Phenolphthalein indicator*, see under alkalinity.

(d) *Methyl orange indicator*, see under alkalinity.

TOTAL ACIDITY.

Add 4 drops phenolphthalein to 50 c.c. or 100 c.c. sample in white porcelain casserole or Erlenmeyer flask over a white surface. Add N/50 Sodium carbonate until solution turns pink.

Total acidity in parts per million of CaCO_3 is equal to the number of c.c. of N/50 Sodium carbonate used, multiplied by 20 if 50 c.c. sample was used, or by 10 if 100 c.c. was used.

FREE CARBON DIOXIDE.

Carbon dioxide may exist in water in three forms—free carbon dioxide, bicarbonate, and carbonate.

One half the carbon dioxide as bicarbonate is known as the half-bound carbon dioxide. The carbon dioxide as carbonate plus one-half that as bicarbonate is known as the bound carbon dioxide.

Pour 100 c.c. of sample into a tall narrow vessel, preferably 100 c.c. Nessler tube. Add 10 drops phenolphthalein, and titrate rapidly with N/22 Sodium carbonate, stirring gently until a faint but permanent pink colour is produced.

The free carbon dioxide in parts per million is equal to 10 times the number of c.c. of N/22 Sodium carbonate used.

If possible a special sample should be collected for this determination, which should preferably be made at the time of collection.

If analysis cannot be made at once, sample bottles should be completely filled with water, so as to leave no air spaces under stopper.

Bottled samples should be kept until tested at a lower temperature than that of water when collected.

FREE MINERAL ACIDS.

Add 2 drops methyl orange indicator to 50 cc. or 100 cc. sample in white porcelain dish or an Erlenmeyer flask over a white surface. Add N/50 Sodium carbonate from a burette until pink color of solution disappears. Acidity due to free mineral acids expressed as CaCO_3 is equal to number of ccs. of N/50 Sodium carbonate, multiplied by 20 if 50 cc. sample was used, or by 10 if 100 cc. was used.

MINERAL ACIDS AND SULPHATE OF IRON AND ALUMINUM.

Modify method for free mineral acids by titrating sample at boiling temperature in presence of phenolphthalein indicator.

The acidity due to free mineral acid and sulphate of iron and aluminum, expressed as CaCO_3 , may be calculated as before.

The acidity due to sulphate of iron and aluminum is equal to acidity due to mineral acids and sulphate minus acidity due to mineral acids.

Report acidity in parts per million of CaCO_3 , Sulphate (SO_4) equals parts per million of CaCO_3 multiplied by 0.96.

DETERMINATION OF CHLORINE AS CHLORIDE.

Solutions required:—

(a) *Standard solution AgNO_3*

(b) *Standard solution NaCl*

(c) *K_2CrO_4 solution.*

NaCl . Weigh accurately 1.648 gms. pure NaCl dissolved in distilled water and dilute to 1 litre. One cc. of this solution is equal to 1 mg Cl .

AgNO_3 . Dissolve about 2.40 gms. of AgNO_3 crystals in distilled water and dilute to one litre. One cc. of this solution contains Ag equivalent to approximately 0.0005 gms. Cl .

K_2CrO_4 . Dissolve 50 gms. neutral K_2CrO_4 in a little distilled water. Add enough AgNO_3 to produce slight red ppt. Filter and dilute to one litre with distilled water.

Analysis.

Measure out 10 cc. sewage sample or 100 cc. water sample into a porcelain dish or casserole, dilute to about 50 cc. for sewage. Add K_2CrO_4 solution sufficient to give a decided colour (3-5) drops. Run in standard AgNO_3 solution from a burette, with constant stirring, until the red colour due to AgCrO_4 appears. To assist the eye in detecting this colour change add at the end of the first titration sufficient NaCl solution to discharge the red colour and keep the dish beside the similar one used in subsequent titrations. Ordinarily the AgNO_3 solution will be of such strength that 1 cc. will equal to 0.5 mgs. of Cl . If necessary apply a correction factor obtained by standardizing the AgNO_3 solution by titration as above with the standard solution of NaCl .

NOTE.

This process is sufficiently accurate for most purposes. In cases where extreme accuracy is desired it is advisable to titrate in Nessler tubes, using a yellow light. If acid waters are to be examined, neutralization with Na_2CO_3 must precede the titration. In examining highly coloured waters preliminary clarification is necessary.

DETERMINATION OF IRON.

Solutions required:—

(a) *Standard Iron Solution.*

This solution is to be of such concentration that 1 cc. contains 0.1 mg. iron. It may be prepared by either of two methods.

(1) Weigh out accurately 0.7 grams pure ferros ammonium sulphate, dissolve in a small volume of distilled water. Add 20cc. 25 per cent. sulphuric acid. Warm and add dilute solution of potassium permanganate until the iron is just oxidized. Dilute with distilled water to 500cc.

(2) Weigh out accurately 0.86 grams ferric ammonium alum, dissolve in 500cc. distilled water, add 5cc. cone nitric acid and dilute to 1 litre.

(b) *Potassium Thiocyanate.*

Weigh out about 5 grams of the salt and dissolve in 500 cc. distilled water.

Analysis.

Into a 100 cc. Nessler tube, pour 4 cc. hydrochloric acid, 1 cc. nitric acid and 50 cc. of the sample. Add 5 cc. potassium thiocyanate solution dilute to the graduation mark with distilled water. If iron be present, a blood red coloration will be produced. To another similar Nessler tube add distilled water, the same amount of iron reagents as above, with sufficient of the standard solution of iron from a burette, to match the colour formed in the tube containing the sample. If the amount of standard required is greater than 3 cc. the sample must be diluted. This procedure will be found satisfactory in ordinary waters. If turbidity interferes evaporate 100 cc. of the sample of dryness in a porcelain dish on the water bath. When dry add 4 cc. hydrochloric acid, 1 cc. nitric acid and evaporate to dryness in the fume cupboard, add 50 cc. distilled water, filter into a 100 cc. Nessler tube, add 5 cc. potassium thiocyanate solution and dilute to the 100 cc. mark with distilled water. Compare with a standard made up from the standard iron solution, using the same amount of reagents.

Notes:—

DETERMINATION OF LEAD.

Solutions required:

(a) *Standard Solution of Lead.*

Weigh out accurately 1.464 grams pure lead sulphate, transfer to a 250 cc. beaker. Add a concentrated solution of ammonium acetate prepared by neutralizing concentrated acetic acid with ammonia, (Litmus). Cover with heat on the hot plate or gauze until dissolved. Cool rinse down with distilled water, and dilute to one litre in a standard flask.

1 cc.=0.001 g. Pb.

(b) *Hydrogen Sulphide Solution.*

Nearly fill a small glass-stoppered bottle with cold distilled water and pass hydrogen sulphide gas into it until saturation is reached. Keep stoppered in a cool place. This solution must be clear and freshly prepared.

FOR COLORLESS SAMPLES. *Analysis.*

Measure 50 cc. sample into a Nessler tube, add two or three drops of acetic acid and 2 cc. hydrogen sulphide water. If a color is produced match the same with varying amounts of the standard solution of lead. Before reporting a negative result it is necessary to concentrate a litre of the water to small volume by boiling in a porcelain dish over the open flame.

FOR COLORED SAMPLES. *Analysis.*

Evaporate two litres of the sample to about 25 cc., add 10 cc. 10 per cent solution of ammonium chloride and ammonium hydroxide to make strongly alkaline. Then add hydrogen sulphide water and allow to stand for three hours. Boil to expel excess of hydrogen sulphide, and filter. Precipitates of iron, suspended organic matter, with copper and zinc may be present. Filter, wash once with hot water, transfer the filter paper and precipitates to the original dish and dissolve the sulphides by boiling with dilute nitric acid (1 part concentrated nitric acid, 5 parts water), filter and wash. Evaporate to 12-15 cc., cool, add 5 cc. concentrated sulphuric acid and heat on the hot plate in the fume cupboard until fumes of sulphuric acid are evolved. Then if the original samples contained less than 0.25 parts iron per million boil, filter and determine the lead in the filtrate, making the standards alkaline with ammonia. If the iron content exceeds 0.25 parts per million, wash the lead sulphate into a beaker, add alcohol and water and allow to settle over night. Filter, wash free from iron with 50 per cent. alcohol. Dissolve the precipitates by boiling with ammonium acetate, filter and determine the lead as before. Copper, if present in considerable quantity, will give a blue colour to the ammoniacal filtrate from the iron precipitate. A more delicate test employs the ferrocyanide reaction. To the ammoniacal filtrate add acetic acid until distinctly acid, then a few drops of potassium ferrocyanide solution. A red-brown precipitate indicates copper.

HYDROGEN SULPHIDE.

Reagents.

- (a) *N/100 sodium thiosulphate.*
- (b) *N/100 iodine solution.*
- (c) *Starch solution.*
- (d) *Potassium Iodide Crystals.*

Add 500 cc. of the sample to 10 cc. of the standard iodine solution and 1 gm. of potassium iodide in a glass-stoppered bottle. Shake the bottle and stand for a few minutes and then titrate the excess of iodine with the sodium thiosulphate solution, using the starch indicator. Hydrogen sulphide in parts per million is equal to 0.34 times the number of cubic centimetres of iodine solution used up by the sample.

CHLORINE.

To test for free chlorine in waters that have been treated calcium hypochlorite or liquid chlorine.

Mix 2 cc. of the potassium iodide solution used in the valuation of bleaching powder, 2 cc. of 95 per cent. acetic acid, 1 cc. of starch indicator in 100 cc. of the sample to be tested. A blue colour indicates the presence of free chlorine. The depth of the color is a rough indication of amount of chlorine.

Notes:—

MINERAL ANALYSIS OF WATER.

Analysis.

Evaporate 1 litre of the sample in a weighed platinum dish upon a water bath. When dry, transfer to an air bath and heat at 105° C. for 30 minutes. Cool and weigh. Then ignite slowly to a dull red heat until all carbonaceous matter is consumed. Cool and weigh. The loss is equal to the weight of the organic matter and the volatile matter. Warm the residue with 10-15 cc. HCl and 25 cc. H_2O . Boil and filter through an ashless filter into a 100 cc. graduated flask, wash the residue thoroughly with hot water and make up to the mark with H_2O .

(1) The residue SiO_2 , Al_2O_3 , CaSO_4 .

Dry, ignite and weigh. Then fuse with Na_2CO_3 in a platinum crucible. Dissolve in H_2O made acid with HCl—evaporate to dryness, take up with H_2O and HCl and filter.

Ignite and weigh the residue, then add 2 drops concentrated H_2SO_4 and a little HFL. Volatilize the acids, ignite, weigh, report loss of weight as SiO_2 .

Make the filtrate alkaline with NH_4OH , boil and filter. The precipitate is Al_2O_3 dry; ignite and weigh. To the filtrate add solution of $(\text{H}_4)_2\text{C}_2\text{O}_4$. Set aside for 3 hours in a warm oven. Filter, dry, ignite and weigh as CaO .

(2) The Solution.

To the boiling solution add a few drops of HNO_3 and a little NH_4Cl solution, add NH_4OH cautiously until alkaline, boil and filter.

The precipitate is Al_2O_3 , Fe_2O_3 . Dry, ignite and weigh.

To the filtrate add $(\text{NH}_4)_2\text{C}_2\text{O}_4$ in slight excess, set aside for 3 hours in warm oven and filter. The precipitate is CaC_2O_4 , wash, dry, ignite and weigh as CaO .

Evaporate the filtrate to dryness in a pt. dish and ignite to expel ammonium salts. Cool, add H_2O , boil, filter and wash well. The precipitate is HgO and MgO . Dry, ignite and weigh as MgO . Transfer the filtrate to a weighed platinum dish, add a few drops H_2SO_4 and evaporate to dryness and ignite to constant weight. The residue consists of Na_2SO_4 , MgSO_4 , K_2SO_4 . After weighing, dissolve in H_2O . Make the solution up to 50 cc. Mix thoroughly and divide into 2 equal portions of 25 ccs. each.

(a) To a portion of the above solution add a few drops of HCl, make alkaline with NH_4OH . Add with constant stirring a solution of HNa_2PO_4 , set aside for 3 hours, filter, dry, ignite and weigh as $\text{Mg}_2\text{P}_2\text{O}_7$. Calculate this to MgSO_4 and after multiplying by 2 subtract from the weight of the alkalies above. Calculate the Mg as MgO .

(b) To the other portion of the solution add a few drops of HCl then a solution of PtCl_4 evaporate on a water bath with some alcohol. Filter off the K_2PtCl_6 on a small tared filter, dry and weigh. Calculate the weight to K_2SO_4 and after multiplying by 2 subtract from the weight of the sulphates above. The difference in weight after subtracting the K_2SO_4 and MgSO_4 is Na_2SO_4 . Calculate the Na to Na_2O and K to K_2O .

(3) SO_3 .

Take 500 c.c. of the original solution. Add 2 c.c. concentrate HCl and evaporate on a water bath, in an open beaker to 150 c.c. Add a hot 10 per cent. solution of $BaCl_2$ until precipitation is complete. Warm for an hour on a hot water bath and allow to settle for at least three hours. Filter, dry, ignite and weigh as $BaSO_4$. Calculate to SO_3 .

Notes:—

(4) CO_2 . This is found by combining the Cl and SO_3 with the bases and then calculating the amount of CO_2 that would be required to convert the rest of the CaO and MgO into carbonates.

(5) Chlorine to be estimated as chlorine in chlorides.

Notes:—

BIOCHEMICAL OXYGEN DEMAND OF SEWAGE AND EFFLUENTS. RELATIVE STABILITY METHOD.

The relative stability method may be employed to obtain a measure of the putrescible material in sewages and effluents in terms of oxygen demand.

Procedure for Effluents: Divide the total available oxygen, including the oxygen of nitrite and nitrate by the relative stability expressed as a decimal.

Procedure for Sewages: Make one or two solutions with fully aerated distilled water of known dissolved oxygen content. Tap water may be employed if it is free from nitrates. Vary the relative proportions of sewage and water to be employed to give a relative stability of 50 to 75. Unless seals are used bring the water as well as the sewage to the temperature at which the mixtures are to be incubated before preparing the dilutions. During the manipulation avoid aeration. Having made the proper dilutions, determine the relative stability of each.

Calculate the oxygen demand in parts per million by the formula:

$$\text{Oxygen demand} = \frac{O(1-p)}{Rp}$$

In this formula, O is the initial dissolved oxygen of the diluting water, p is the proportion of sewage; and R is the relative stability of the mixture. Ordinarily the available oxygen in crude sewages, septic tank effluents, settling tank effluents, and trade wastes can be neglected.

RELATIVE STABILITY OF EFFLUENTS.

Reagent.—*Methylene blue solution.*

A 0.05 per cent. aqueous solution of methylene blue, preferably the double zinc salt or commercial variety.

Collect the sample in a glass-stoppered bottle holding approximately 150 cc. If the dissolved oxygen is low observe precautions similar to those used in collecting samples for dissolved oxygen.

Add 0.4 cc. of the methylene blue solution to the sample in the 150 cc. bottle. As methylene blue has a slightly antiseptic property be careful to add exactly 0.4 cc. Add the methylene blue solution preferably below the surface of the liquid after filling the bottle with the sample. If the methylene blue is added first do not allow the liquid to overflow as colouring matter will thus be lost. Incubate the sample at 20°C. for ten days. Four days' incubation may be considered sufficient for all practical purposes in routine plant-control work. If quick results are desired, incubate the sample at 37°C. for five days, using suitable stoppers to prevent the loss and reabsorption of dissolved oxygen. The bacterial flora at 37° C. is different from that at 20° C. The lower temperature is more nearly the average temperature of surface waters, and therefore the higher temperature should be used only when quick approximate results are essential. Observe the sample at least twice a day during incubation. Give a sample in which the methylene blue becomes decolourized, a relative stability corresponding to the time required for reduction (see Table). For routine filter control ordinary room or cellar temperature gives fairly satisfactory results. For accurate studies, room temperature incubation is very undesirable, as the fluctuations in temperature which are ordinarily not noticed are responsible for appreciable

deviations from the true values of relative stability. If the samples are incubated less than ten days at 20°C., and are not decolourized, place a plus sign after the stability value in order to indicate that the stability might have been higher if more time had been allowed. In applying this test to river waters it often happens that the blue colouring matter is removed either partly or completely through absorption by the clay which many rivers carry in suspension. True relative stabilities cannot be obtained for such waters except by determining the initial available oxygen at the start and bio-chemical oxygen demand on incubation at 20° C. for ten days. Germicides, such as hypochlorite of lime, if present, in sufficient quantity, vitiate the results. If a sample contains free chlorine, therefore, store it about two hours, or until the chlorine is gone, and then add methylene blue.

The Table gives the relation between the time in days to decolourize methylene blue at 20°C. and the relative stability number or ratio of available oxygen to oxygen required for equilibrium, expressed in percentage.

RELATIVE STABILITY NUMBERS.

Time required for decolorization at 20°c.		Relative Stability.	Time required for decolorization at 20°c.		Relative Stability.
Days		Percentage	Days		Percentage
0.5		11	8.0		84
1.0		21	9.0		87
1.5		30	10.0		90
2.0		37	11.0		92
2.5		44	12.0		94
3.0		50	13.0		95
4.0		60	14.0		96
5.0		68	16.0		97
6.0		75	18.0		98
7.0		80	20.0		99

The theoretical relation is, $S=100 (1-0.794t^{20})$. The relation between the time of reduction at 20°C. and that at 37°C. is approximately two to one, but if an observer incubates at 37°C. he should work out his own comparative 37°C. table or factor.

A relative stability of 75 signifies that the sample examined contains a supply of available oxygen equal to 75 per cent. of the amount of oxygen which it requires in order to become perfectly stable. The available oxygen is approximately equivalent to the dissolved oxygen plus the available oxygen of nitrate and nitrite. Nitrite in sewage is usually so low as to be negligible.

ANALYSIS OF SEWAGE SLUDGE AND MUD DEPOSITS.

COLLECTION OF SAMPLE.

Collect a representative sample of the material. In general more than one sample should be taken from a spot and a large number of samples should be collected rather than a few large samples. If the surface layer is darker and a lower layer consists of pure clay, sample only the surface layer. Samples may be analyzed either separately or as composites of careful mixtures. After the sample has settled a few minutes roughly drain or siphon the excess water. Allow sewage sludge to stand for one hour before draining it free from excess water unless it is essential to determine the moisture content of the sample originally collected. If sludge cannot be analyzed within twenty-four hours it is better not to use air-tight bottles and to add small quantities of chloroform and keep in the ice box to retard decomposition. At the time of collection carefully examine mud from the bottom of surface water for evidence of sewage pollution and macroscopic and microscopic animal and plant organisms. Record the predominant species. Note the physical appearance of the material, particularly its colour, odor, and consistency. Express all analytical results in percentage on a dry basis.

REACTION.

Determine the reaction by diluting a definite quantity of the wet sludge and titrating by the methods given under alkalinity and acidity (pp. 35-39 and 39-41).

SPECIFIC GRAVITY.

Weigh to the nearest tenth of a gram a wide-mouthed flask of 100 to 300 c.c. capacity, according to the quantity of material available. Then completely fill the flask with distilled water to the brim and weigh it again. Empty the flask and fill it completely with fresh sewage sludge or mud. If the material is of such consistency that it flows readily fill the flask to the brim and weigh. The specific gravity is equal to the weight of the sludge or mud divided by the weight of an equal volume of distilled water.

If the material does not flow readily fill the weighed flask as completely as possible without exerting pressure during the procedure. Weigh and then fill the flask to the brim with distilled water. Let it stand for a few minutes, until trapped air has escaped, then add more water if necessary and weigh. Subtract the weight of the added water from the weight of the water that completely fills the flask; the specific gravity is equal to the weight of the material divided by this difference. Record the specific gravity only to the second decimal place.

MOISTURE.

Heat approximately 25 grams of sludge or mud in a weighed nickel dish on the water bath until it is fairly dry. Dry the residue in an oven at 100° C., cool and weigh. Repeat to approximate constant weight. The loss in weight is moisture.

VOLATILE AND FIXED MATTER.

Ignite, at dull red heat in a hood, the residue from the determination of moisture until all the carbon has disappeared. Cool the residue in a desiccator and weigh it. The residue is the fixed matter. The volatile matter is the difference in weight between the original dried sludge and the ignited sludge.

TOTAL ORGANIC NITROGEN.

Preparation of sample.—For the determination of organic nitrogen and fats dry approximately 50 to 75 grams of the sludge or mud in a porcelain dish first on the water bath and finally in the hot water oven until all the moisture has disappeared. Grind the dry material to a fine powder and keep it in a glass-stoppered bottle.

Reagents:

- (a) *Sulphuric acid*, concentrated nitrogen free.
- (b) *Copper sulphate solution*. Ten per cent.
- (c) *Potassium permanganate*. Crystals.

Weigh accurately 0.5 gram of dried sludge or 5.0 grams of dried mud and put it into a 500 c.c. Kjeldahl flask. Digest it with 20 c.c. of sulphuric acid, or more if necessary, and 1 c.c. of copper sulphate solution to assist the oxidation. Boil for several hours until the liquid becomes colorless or slightly yellow. Oxidize the residue with 0.5 gram of potassium permanganate and neutralize with NaOH solution free from NH_3 and distil as in the organic nitrogen.

ETHER-SOLUBLE MATTER.

Fats are usually determined only on sewage sludge, but some mud deposits contain small quantities due to the presence of trade wastes.

Procedure.—Weigh 0.5 to 25 grams of dry material according to the quality of the sludge or mud. Add water to the weighed portion in a porcelain dish and acidify the mixture with N/50 sulphuric acid in the presence of litmus tincture or azolitmin solution as indicator. Avoid adding too much acid as an excess gives too high results on account of fatty acid residues. Evaporate the acidified mixture to dryness on the water bath, and heat it in the hot air oven at 100°C . two to three hours. Extract the dry residue with boiling ether, rubbing the sides and bottom of the dish to insure complete solution of the fat. Three extractions with ether are usually sufficient. Filter the ether solution through a 5 cm. filter paper into a small flask. Evaporate the ether slowly, dry the fatty extract for half an hour at 100°C ., cool in a desiccator, and weigh. If it is desirable, particularly with certain industrial wastes, to determine the quantity of saponified fat determine the fats with and without the addition of acid. The difference between the quantities found by the two determinations is the content of saponified fat.

FERROUS SULPHIDE.

The liberation of hydrogen sulphide on adding dilute hydrochloric acid to a sludge indicates the presence of ferrous sulphide. As ferrous sulphide quickly oxidizes on exposure to air a quantitative determination of this constituent must be made immediately after collection of the sample.

Procedure.—Heat a definite portion of the sludge with hydrochloric acid in a flask. Pass the liberated gas through bromine water or hydrogen peroxide. Determine gravimetrically the sulphate in the oxidizing solution, and calculate the equivalent of ferrous sulphide by multiplying the weight of barium sulphate by 0.376.

VALUATION OF BLEACHING POWDER.

Reagents:

(a) *N/10 sodium thiosulphate solution.*

24.8 gms. of $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ are dissolved in a litre of distilled water at 15°C .

(b) *N/10 iodine solution.*

1.27 grams pure resublimed powdered iodine are weighed into a 100 c.c. flask. 20 c.c. of a 10 per cent. solution of potassium iodide (free from iodate) is then added and the mixture shaken gently until the iodine is dissolved. It is then diluted to a 100 c.c. with water at 15°C . Keep in the dark in a well stoppered bottle.

(c) *Starch solution.*

One to two grams of powdered white potato starch are mixed with 5 to 6 c.c. of cold water in a 250 c.c. beaker. Pour on the mixture boiling water until the appearance of the mixture changes suddenly to that of a semi-translucent gelatinous substance. Then add cold water until the beaker is nearly full. Settle and decant the clear supernatant liquid. Add drop of chloroform as preservative.

(d) *Potassium iodide solution.*

Five grams of potassium iodide in 100 c.c. of water.

(e) *Acetic acid.*

Five normal acetic acid.

Standardization of the sodium thiosulphate solution. Twenty-five cc. of the N/10 iodine solution are transferred by means of a pipette to a beaker, diluted with an equal volume of water. The N/10 thiosulphate solution is then run in slowly from a burette until the brown colour of the iodine solution pales perceptibly and the liquid assumes a straw colour. One or two drops of starch solution are then added and the thiosulphate solution delivered drop by drop until the blue colour is just discharged. If the solutions are strictly decinormal, 25 cc. of the thiosulphate solution should be used and 1 cc. of the thiosulphate solution will be oxidized by 0.0127 grams of iodine or 0.00355 gms. chlorine. The strength should be recorded on the label.

Analysis.

About 10 grams of the bleaching powder to be examined are weighed into a porcelain mortar, and rubbed down with a small quantity of water until the mixture has the consistency of thin cream; settle for a moment or two and decant the milky liquid into a litre flask. The residue is then ground down with a little more water and the process is repeated until the last traces have been transferred to the flask. The mixture is made up to a litre with water and thoroughly shaken. Twenty-five c.c. of the milky fluid are transferred by means of a pipette to a small beaker, the contents of the flask having been well shaken just prior to the withdrawal of the sample—10 c.c. each of the KI solution and acetic acid are added. The titration of the thiosulphate is carried out as in the standardization of the thiosulphate against the iodine solution. As the strength of the thiosulphate is known the percentage of available chlorine in the original sample is easily calculated.

NOTE.—The standardization of the thiosulphate and the estimation of the Cl should always be done in duplicate.

Notes:—

VALUATION OF SULPHATE OF ALUMINIUM.

Reagents required:

- (a) *Concentrated hydrochloric acid* sp. gr. 1.20.
- (b) *Ammonium hydroxide* sp. gr. 0.90.
- (c) *25 per cent. sulphuric.*
- (d) *Methyl orange solution.*
- (e) *Phenolphthalein solution.*
- (f) *Bromine water.*
- (g) *N/20 stannous chloride.* Should be frequently standardized against iron—1 c.c. N/20 stannous chloride=0.0028 grams of iron estimated in the ferrous state.
- (h) *Normal sodium hydroxide solution*—free from carbonate.

To be determined:

Aluminium oxide.
Ferrous oxide.
Ferric oxide.
Basicity ratio.
Free sulphuric acid.

INSOLUBLE MATTER.

Dissolve 10 grams of the crushed sample ($\frac{1}{8}$ to $\frac{1}{4}$ -inch diameter) in 100 c.c. water and digest at boiling temperature for one hour. Filter through a tared Gooch crucible. Wash the insoluble matter with freshly-boiled hot water. Dry to constant weight at 100° C. Cool and weigh, report as per cent. insoluble matter.

OXIDES OF ALUMINIUM AND IRON.

Dilute the filtrate from above to 500 c.c with water free from carbon dioxide. Measure 50 c.c. of the solution into a 250 c.c beaker. Add about 150 c.c. of water and 5 c.c. of hydrochloric acid and a few drops of nitric acid and boil. Add a few drops of ammonium chloride solution then ammonium hydroxide in slight excess. Digest for a few minutes at 100° C. Wash by decantation through a filter. Dry, ignite in a blast, cool and weigh. If much iron is present ignite the paper separately.

Subtract the total iron expressed as oxide and report the difference as aluminium oxide in percentage.

TOTAL IRON.

Dissolve 10 grams of the sample in 50 c.c. of freshly-boiled distilled water, add 5 c.c. concentrated hydrochloric acid and 1 c.c. of bromine water. Evaporate to dryness. Dissolve the residue in water and wash into a flask making the volume up to 50 c.c. Add 50 c.c. concentrated hydrochloric acid, boil and titrate as hot as possible with N/20 stannous chloride.

FERRIC IRON.

Dissolve 20 grams in 50 c.c. of boiling distilled water to which has been added 50 c.c. of hydrochloric acid. Keep the mixture boiling till the sample is dissolved. Keep flask full of carbon dioxide by adding occasionally small amount of sodium carbonate. When sample is completely dissolved titrate immediately with N/20 stannous chloride.

FERROUS IRON.

Is calculated as the difference between the total iron and the ferric iron. Per cent. difference $\times 0.9$ is the per cent. of ferrous oxide.

NOTE.—A rough method of estimating the total iron is to dissolve a sample and estimate the iron colorimetrically, as given for the estimation of iron in water.

BASICITY RATIO.

Fifty c.c. of the filtrate from the determination of insoluble matter is pipetted to a 200 c.c. casserole diluted to 100 c.c. and titrated at boiling temperature against N/1 sodium hydroxide solution, using phenolphthalein indicator. The percentage of acidity in equivalent of sulphuric acid = number of cubic centimeters of sodium hydroxide $\times 4.9$.

The percentage of sulphuric acid equivalent to the determined aluminium and iron oxide is calculated by the following formula:

$$2.88 \times \text{Al}_2\text{O}_3 + 1.83 \times \text{Fe}_2\text{O}_3 + 1.36 \times \text{FeO}.$$

If the percentage of acid equivalent is less than found by titration the difference is reported as percentage free acid, if greater the difference divided by 2.88 is the percentage equivalent to the excess aluminium oxide present. Divide this excess by the percentage of total aluminium oxide and report quotient as basicity ratio.

Notes:—

REPORT OF
The Provincial Board of Health
Experimental Station

BULLETIN No. 6

INTRODUCTION

By F. A. DALLYN

A—REPORT RELATING TO THE MANUFACTURE OF VITRIFIED
CLAY SEWER PIPE IN ONTARIO

By A. R. DUFF

Assistant Chemist, Experimental Station

B.—SUGGESTED STANDARDS FOR SEWER CONSTRUCTION, INCLUDING
PROPOSAL FOR BID OR ESTIMATE, BID OR ESTIMATE,
BOND, CONTRACT AND SPECIFICATIONS

By F. A. DALLYN, C.E. (Tor.)

Provincial Sanitary Engineer

The Provincial Board of Health Experimental Station

BULLETIN No. 6

INTRODUCTION.

The Province of Ontario has an area of 126,000,000 acres. The population in 1915 was estimated as 2,767,350, of which approximately forty-two (42) per cent. is found in some 276 cities, towns and villages. The Statutes of Ontario relegate the supervisory control of all waterworks and sewer construction to the Provincial Board of Health, which authority is set out in The Public Health Act. The Provincial Board with the consent of the Lieutenant-Governor-in-Council may make such Regulations as may be deemed necessary for "the location, construction, repair, renewal, alteration and inspection of sewers, drain pipes, man-holes, gulley traps, flush tanks and other works in or upon public, municipal or private property forming part of or connected with any municipal sewerage system." (Sec. 8, s.s. ddd.) The Board in 1916 undertook an inquiry into the manufacture of vitrified clay pipe in Ontario. The findings are shown elsewhere in this volume. Certain regulations are suggested and it is hoped that they will be interpreted in no sense as a restraint on trade or development of engineering enterprise, but rather as an attempt to fix certain minimum requirements and provide for a limited standardization made necessary by the nature, magnitude and permanency of the work.

The position of the Board can be better appreciated when it is realized that from four to five million dollars' worth of construction is passed upon by the Board annually. The excellence of the Act as amended in 1912 is largely responsible for this splendid showing. Sec. 95 provides (1) "No by-law shall be passed for raising money for any of the purposes mentioned in sections 89 and 94 until the proposed water supply or sewerage system, as the case may be, has been approved by the Provincial Board of Health, and such approval has been certified under the hand of the Chairman and Secretary of the Board."

The Secretary is the executive officer of the Board and owing largely to the expeditious manner in which applicants come up for consideration, practically no complaint is heard and a general compliance is experienced, as is shown by the magnitude of the construction. It is of interest to other provinces that certain Ontario municipalities, at first resistant to the control of the Board, soon discovered that the cost of subsequently validating improper debenture issues or the cost of issuing proper debentures at a later date to re-establish the municipal bank account was considerably increased by reason of irregularities during construction, the validation involving as it does searches, certificates of the Railway and Municipal Board or Private Bills and in all instances the consent of the Provincial Board of Health as a fundamental necessity.

The work of the Board necessitated the creation of an Engineering Department and the operation of an Experimental Station. It was felt that the best service such a department could afford the Province was to act in a consulting capacity to the various municipalities within the limitation of the Statutes and by regulation direct their expansion along well considered and right lines.

The regulations governing the submission of plans were approved in October, 1914 (see page 195) and require that municipalities shall supply certain necessary information with each application, and since the work is largely an engineering matter, the information required is of a nature that it is necessary even for the smaller municipalities to avail themselves of the services of a qualified engineer. The Municipal Act recognizes this need and it is provided that engineering services may be charged to the undertaking and the money raised in the same manner as for the proposed work. It may be stated that in the experience of the Board the employment of a competent engineer works decidedly to the advantage of the municipality, and most decidedly affects cost, maintenance and the character and permanency of structure in the town plan.



Sewer trench, showing careless back filling over freshly-laid sewer.

The work of the Department has shown that there has been for some years past a recognized need in the Province for a specification covering the manufacture and laying of sewer pipe. The sewer pipe manufactured in Ontario is **essentially** different from the pipe imported into Ontario, both as to quality and appearance.

TABLE NO. I.

Name of Municipality.	Population 1914	Sewers and sewage disposal.		Water Works and Water Purification.		Sidewalks.		Roads, etc.		Total of these items.	
		Total expenditure up to 1914.	Dollars per head.	Total expenditure up to 1914.	Dollars per head.	Total expenditure up to 1914.	Dollars per head.	Total expenditure up to 1914.	Dollars per head.	Total expenditure up to 1914.	Dollars per head.
*Berlin.....	18,338	\$ 413,222 70	22.5	\$ .....	.....	\$ 130,000 00	7.1	\$ .....	.....	\$ .....	.....
*Bowmanville.....	3,519	54,151 86	15.4	101,920 35	29.0	35,000 00	9.9	2,500 00	.....	193,572 21	55.0
*Brampton	3,500	79,204 63	22.6	155,624 11	44.2	88,738 13	25.3	68,649 43	19.6	392,216 30	111.7
*Bridgeburg	1,713	89,072 62	52.0†	50,800 00	30.2	.....	.....	.....	.....	139,872 62	82.2
Cochrane	2,500	102,074 00	.....	Sewers and Waterworks 74,373 00	*40.8	39,875 78	.....	Sidewalks and Roads 30,000 00	15.9	142,949 78	56.7
Collingwood.....	6,646	87,944 00	13.2	276,355 17	11.2	68,304 00	10.3	.....	4.5	260,621 00	39.2
Galt.....	11,932	420,562 52	35.3	.....	23.1	148,012 73	12.4	15,711 61	1.3	860,641 83	72.1
Goderich.....	4,906	.....	11.1	.....	30.2	.....	.....	.....	.....	.....	41.3
*Guelph	16,319	276,072 00	16.9	370,867 20	22.7	186,461 00	11.4	270,581 00	16.8	1,103,981 20	67.8
Haileybury	3,716	81,773 03	22.0	134,758 82	36.3	23,506 00	6.3	27,826 06	7.5	267,863 91	72.1
New Liskeard.....	2,200	54,613 31	24.8	90,763 70	41.2	8,328 67	3.7	5,000 00	2.3	158,705 68	72.1
North Bay.....	8,782	125,213 47	14.2	201,032 45	22.9	97,267 68	11.1	94,796 84	10.8	518,310 44	56.7
Peterboro'	20,150	208,909 15	10.3	512,000 00	25.4	219,743 03	10.9	24,776 92	1.2	965,429 10	47.9
Pictou	3,615	.....	.....	35,000 00	*9.7	60,000 00	.....	Sidewalks and Roads 1,081,254 97	16.5	*95,000 00	26.2
Port Arthur.....	18,025	906,165 00	50.3†	1,307,576 00	72.6	207,759 03	15.4	.....	56.2	3,502,755 00	194.4
*Preston	4,923	75,000 00	15.2	128,000 00	26.0	42,387 82	8.6	.....	none	245,387 82	49.8
*Rainy River.....	1,572	29,969 65	19.0	33,487 45	21.3	.....	none	7,511 97	4.7	70,969 07	45.0
*Simcoe	4,117	61,633 00	14.8	90,012 00	21.8	47,504 17	11.4	3,000 00	.7	202,149 00	48.8
*Waterloo	4,737	113,555 66	24.0	101,000 00	21.3	83,872 50	17.7	112,119 51	23.7	409,547 67	86.7
*Weston	2,200	150,558 00	68.4†	83,000 00	37.7	21,000 00	9.5	.....	.....	254,558 00	115.6
*Woodstock	10,150	116,018 55	11.4	237,217 92	23.4	160,000 00	15.7	48,187 85	4.7	561,424 32	55.3
Average .....	.....	average	16.2	average	30.0	.....	.....	.....	.....	average	72.1
Chicago.....	.....	.....	15.1	.....	.....	.....	.....	.....	.....	.....	.....
Detroit	571,372	.....	.....	.....	22.1	.....	.....	.....	.....	.....	.....

* Municipalities marked * have sewage disposal works. † Omitted from average.

TABLE 2.

Summary number of feet of Vitrified Clay Sewer Pipe Laid in the years 1911, 1912, 1913, 1914, 1915 by Ontario Municipalities.

Year.	6 in.	8 in.	9 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	30 in.	36 in.	42 in.	48 in.	60 in.	72 in.	Total No. of feet.
1911..	18,924	19,855	60,884	26,551	157,422	38,453	28,084	.....	.....	14,123	108	.....	1,390	552	310	1,088	369,274
1912..	24,841	46,543	46,076	49,840	138,980	36,243	27,458	872	.....	23,207	1,292	1,738	235	1,803	1,390	2,094	404,472
1913..	28,616	21,882	83,232	21,950	160,628	40,710	28,448	1,738	.....	18,145	6,227	2,390	195	.....	.....	.....	414,161
1914..	19,808	44,356	122,861	39,276	227,203	71,954	37,978	5,269	1,770	34,174	97	.....	3,740	.....	.....	.....	608,486
1915..	23,661	16,533	61,117	10,257	102,774	29,224	20,316	1,002	.....	10,548	1,152	.....	.....	.....	.....	.....	276,584
Total.	115,850	149,169	374,170	147,874	787,007	216,584	142,284	8,881	1,770	100,207	8,876	4,128	5,560	2,355	1,700	3,182	2,072,977

Returns of municipalities to the Provincial Board of Health, 1916.

The investigation undertaken by the Board and set out in the report was primarily an effort to establish the worth of the Ontario product and to ascertain the possibility and the advisability of standardizing the sizes of pipe.

Tests were made and incorporated with report. The results indicate that Ontario pipe when well vitrified is extremely strong and that to all intents and purposes a standard size can be agreed upon which will permit of all municipalities using similar pipe and not as is the present case—having special requirements for each of the several larger users. A standardized product will then permit of the burning operation and whole process of manufacture being carried on more successfully and will overcome the necessity of mixing large and small sizes of pipe in the kiln.



The Dominion Sewer Pipe Co., Ltd., Swansea, Ont.

The needs of the Province are at this time sufficiently known and the proportion of the various sizes sufficiently established to permit of fairly large stocks being carried by the manufacturers.

There is no good reason why municipalities could not estimate and place orders for the major portion of their yearly requirements twelve months ahead of delivery and, where sewer construction is let by contract, provide that all pipe used is to be taken from the corporation's standing order at a price made known at that time. Such an arrangement works to the advantage not only of the manufacturer but of the municipal corporation and the labour connected with the industry as well.

Incidentally other information relating to the manufacture and distribution of pipe has been obtained by the Board and as far as possible has been included in the text for the information of City Engineers, Inspectors and students interested.

In the effort to determine the extent to which sewer pipe is used throughout the Province the following summaries will be of use in correlating the effect of increase in population and the need and extent of building and sewer construction. (a) The sewerage systems of the Province of Ontario cost on an average of \$16.2 per capita. (b) The average dwelling in Ontario cities has 4.21 persons occupant; (c) The average total cost per dwelling = $\$16.2 \times \$4.21 = \$68.2$. (This does not include the cost of house connections.)

Table No. 1 fairly summarizes the pre-war development of a few Ontario municipalities:

It is with difficulty that a clear idea can be had of the probable demand after the war for municipal improvements, especially sewerage. Sufficient to say that a rapid increase in population by immigration is anticipated. Table No. 2 is a summary of the vitrified clay tile pipe laid by some twelve cities and nineteen towns representing approximately ninety per cent. of the total amount of sewer pipe laid in Ontario for the noted years.

The Department of Customs reports, as to the value of drain and sewer pipe imported into Ontario during the fiscal years ending 31st March, 1911, 1912, 1913, 1914, 1915, 1916, are incorporated in Table No. 3.

TABLE 3.
Importation of Sewer Pipe into Ontario.

Year ending March 31st.	Great Britain.	U. S. A.
	\$	\$
1911.....	3,150	31,742
1912.....	3,584	53,867
1913.....	15,389	72,679
1914.....	4,747	81,194
1915.....	10,152	86,079
1916.....	5,114	13,843

The figures presented in the following table will support the conclusion that even under existing conditions an Ontario industry of considerable magnitude has developed in the manufacture of vitrified clay sewer pipe and in point of output the Ontario plants are readily capable of supplying the entire demand of the Ontario Municipalities.

TABLE 4.
Value of Sewer Pipe manufactured in Ontario for the noted years.
From the Census and Statistics Office the following information was obtained:

Census Return. 1900.	Census Return, 1910.	Mines Report Return 1915.
\$ 369,631	\$ 623,458	\$ 795,646

An attempt to explain the importation of pipe from the United States of America would involve a discussion of freight rates to Western points in the Province which at present are equivalent to 50 per cent. of the net value of the pipe at the factory and also a discussion of the engineering prejudice against the inferior pipe included in shipments frequently (if gossip were truth) literally forced on some of the smaller municipalities by Ontario manufacturers.

The inquiry, the report and the recommendations first as to manufacture, second, as to standard sizes, are attempts to be of real assistance to the municipalities without any interference with the powers properly vested in Municipal Councils, powers so typical of our Ontario development of municipal control.

The Suggested Standards for Sewer Construction include Proposal for Bid or Estimate, Bid or Estimate, Bond, Contract and Specifications, and certain Standard Details of Construction.

A most novel feature of the proposed standard form of Proposal for Bids or Estimates, is the introduction of an engineer's estimate of quantities, the responsibility of which is assumed by the municipality, the municipality being amply protected by the municipal rates for extra work, included in the contract agreement. These have been suggested for the reason that no municipal record is complete which does not permit of future analysis. Unfortunately with very few exceptions municipal records are very indifferently kept from this point of view and it is for the same reason that in applications for the Board's approval it is required that the following table be filled in:

TABLE No. 5.—SUMMARY OF COST.

Classification of Work	Units	Quantities	Rate	Amount
Sewer Material only.....	per foot	.....	.....	.....
Sewer Material only.....	per foot	.....	.....	.....
Sewer Material only.....	per foot	.....	.....	.....
Sewer Material only.....	per foot	.....	.....	.....
Laying Sewer	per foot	.....	.....	.....
Laying Sewer	per foot	.....	.....	.....
Laying Sewer	per foot	.....	.....	.....
Laying Sewer	per foot	.....	.....	.....
Excavation and Backfilling in	per cu. yd.	.....	.....	.....
Excavation and Backfilling in	per cu. yd.	.....	.....	.....
Excavation and Backfilling in	per cu. yd.	.....	.....	.....
Tunnelling on	per foot	.....	.....	.....
Repair to Pavements.....	Total	.....	.....	.....
Resurfacing Street.....	Total	.....	.....	.....
Building Manholes, complete.....	each	.....	.....	.....
Building Lampholes, complete.....	each	.....	.....	.....
Building Flush Tanks, complete	each	.....	.....	.....
Gullies and Catch Basins, complete.....	each	.....	.....	.....
Branches	Total	.....	.....	.....
Engineering and Inspection	Total	.....	.....	.....
Extras	Total	.....	.....	.....
Anticipated Bond Issue Depreciation.....	below par	.....	.....	.....

Records are essential, if any proper control is to be had over extravagant construction and if logical town planning is to be realized. The items for sewer construction most capable of variation are the type of material to be excavated and the handling of labour. It is only by taking advantage of careful analytical study of costs that municipal engineers can give advice as to whether they themselves or contractors on municipal work are taking the fullest advantage of their labour and equipment and as to whether the work has been constructed economically or not. So many councillors and local engineers continue to believe that all things are satisfactory for which satisfactorily signed vouchers can be produced without inquiry as to whether the work could have been done just as satisfactorily at thirty or forty per cent. less cost.

In recommending fuller information on the part of the Engineer in preparing plans and estimates it may be said that contractors in estimating must of necessity leave ample margins to provide for unexpected contingencies made possible by the vagueness of the Engineer's plans or lack of information, and also for profit. These contingencies do not usually arise although they are almost invariably provided for by the contractor; that is, contractors undertake to carry on work with a safe margin of profit. It has been incorrectly assumed by some municipalities that contractors bidding on work the character of which they are ignorant of will as a rule under-bid the job. Incidents of under-estimations are becoming less and less frequent. In the long run it must be appreciated that no contractor can continue work at a loss, and what is lost on one job is naturally provided for in another. So that a municipality doing considerable construction will pay the contractor's profit and any losses he may have sustained.

It is now recognized by all engineering bodies and admitted by contractors that the fuller the knowledge or information submitted at the time of asking for bids, the freer the bidding and the closer the proposals. Concealed knowledge undoubtedly works to the advantage of the favoured contractors, but, in general, increases the bidding all the way through. The favoured contractor, while bidding lower than others, will have a wider margin and almost invariably will bid higher than if the bid were open; that is, his bidding in all probability is not as low as if the bidding were truly competitive.

In some instances a contractor will be able to bid very much lower than another in view of the fact that he may have an idle plant or adjacent contracts which give him advantage over others not so favourably situated. In new work the competitive bidding should be fairly close and the total costs will provide for labour, cost of material, interest on plant investment, moving of equipment, restoration of streets, maintenance, interest on guarantee and withheld moneys, together with contractor's profit.

Where a municipality is doing its own work, several of these items do not enter into the cost and frequently the City Engineer has as much as 20 per cent. margin over and above that which a contractor should bid. For proper comparison of proposals the City Engineer should not include profit in his undertaking, but should include contingencies. The debenture issue should include provision for variation from par value at time of sale.

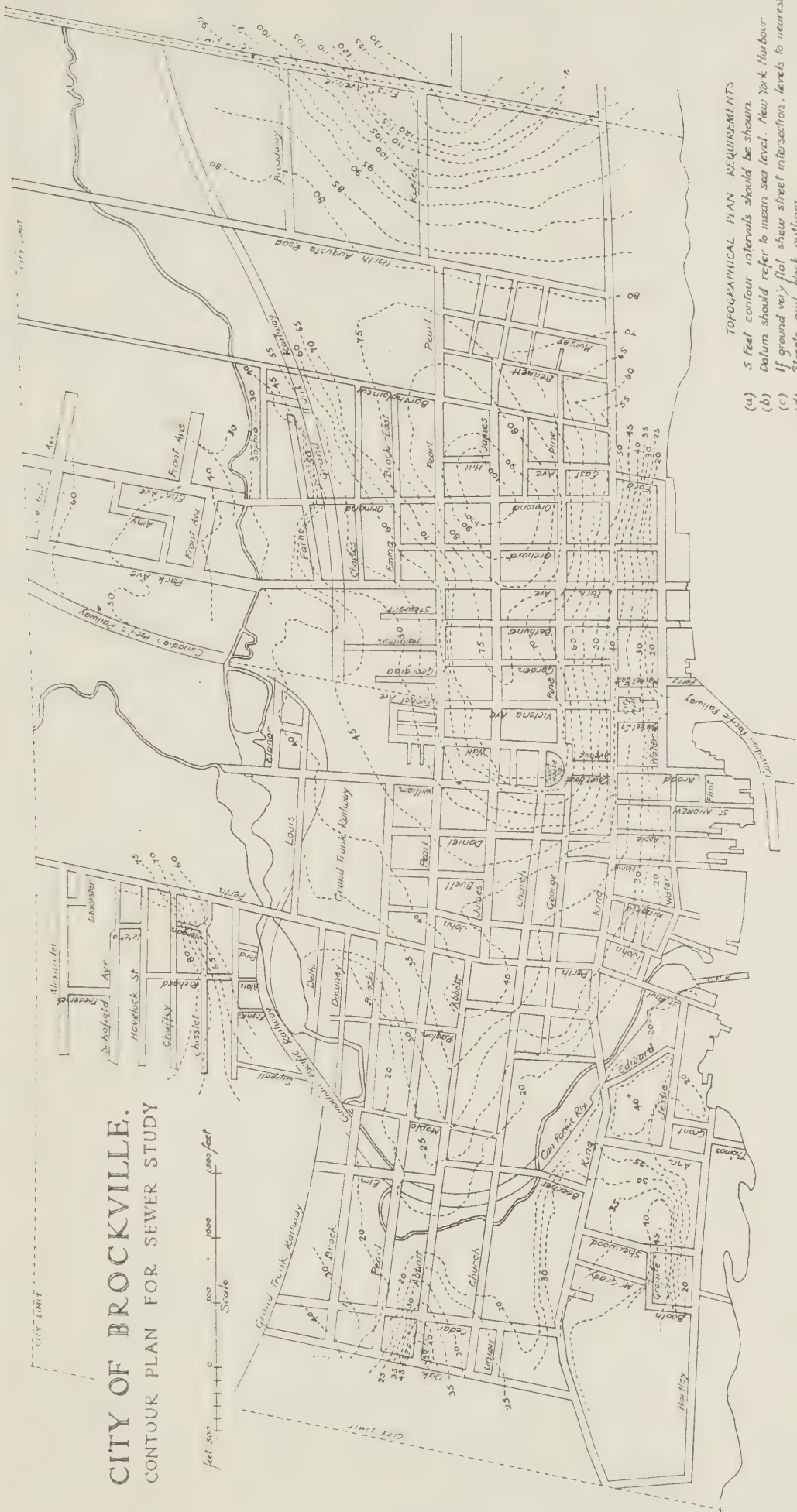
Schedules and forms for the keeping of cost data for municipal sewer construction are included with the proposed standards for sewer construction. When the work is done by contractor the resident engineer should be required to keep such forms. The actual cost to the contractor will not always be obtained but many items affecting the work and subsequent letting of contracts will be known and can be taken advantage of. The standard details of construction included in this report are mainly for the information of students and the younger of the municipal engineers.

F. A. DALLYN.

Standards for Municipal Records 1915.

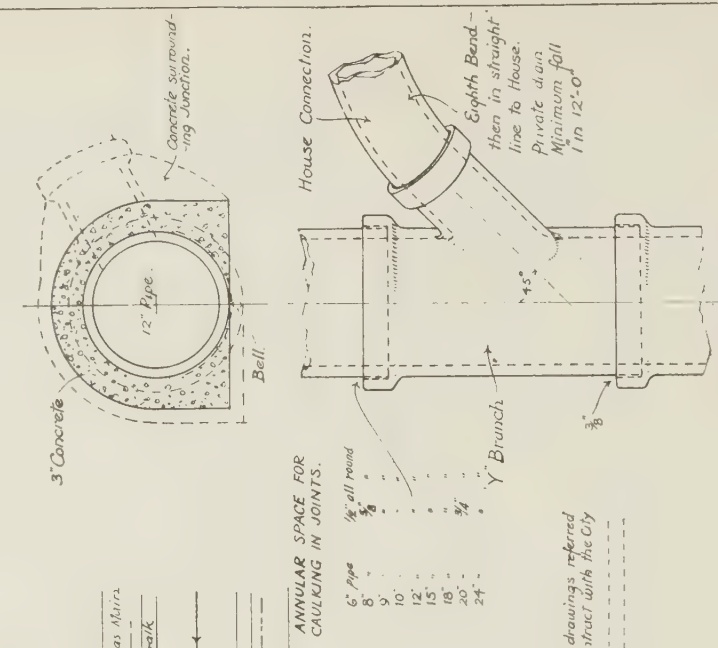
The Provincial Board of Health of Ontario

CITY OF BROCKVILLE.
CONTOUR PLAN FOR SEWER STUDY



- TOPOGRAPHICAL PLAN REQUIREMENTS
- (a) 5 Feet contour intervals should be shown.
 - (b) Datum should refer to mean sea level. New York Harbour
 - (c) If ground very flat show street intersection, levels to nearest 1/2 foot
 - (d) Streets and block outlines
 - (e) All watercourses, open drains, swampy ground, lakes, ponds
 - (f) Present or proposed location of water works and position of intake

SECTION OF SEWER.

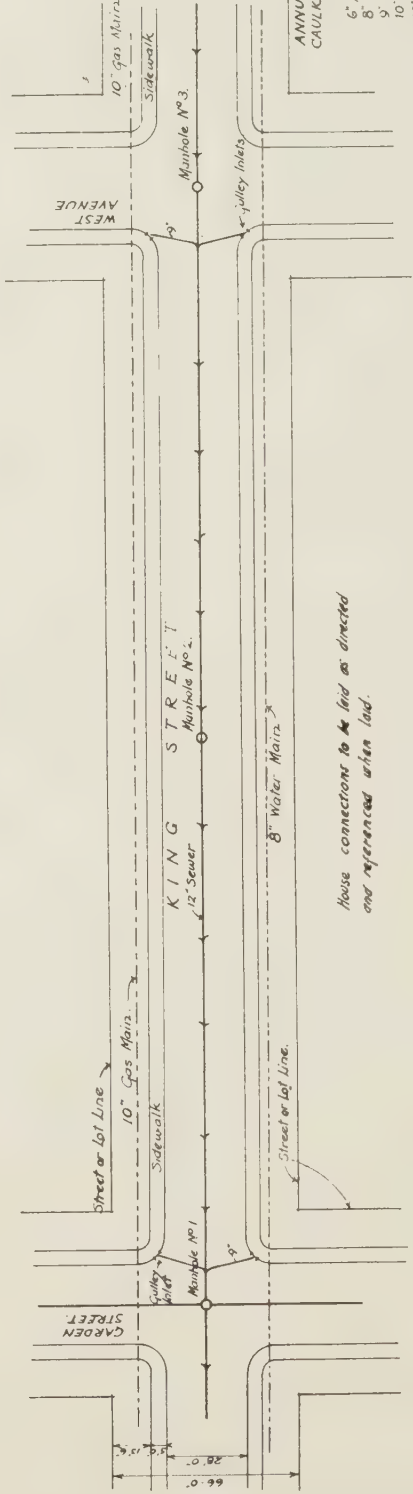


12" SEWER KING ST.
(GARDEN ST. TO WEST AVE)

- 2 Standard Manholes Type -
- 1 Special Manhole
- 39.5 Lin ft. 12" vitrified Pipe
- 20 12" x 6" Private Drain Connections
- 4 12" x 9" Gully Connections.

ENGINEERS
ESTIMATE.

inspected -
approved



PLAN

Horizontal Scale.

Note :- This is one of the drawings referred to in the Contract with the City Dated - Witness -



PROFILE.

REGULATIONS GOVERNING THE PREPARATION AND SUBMISSION
OF PLANS AND SPECIFICATIONS RELATING TO A SEWERAGE
SYSTEM, SEWAGE DISPOSAL SYSTEM, COMMON SEWER
OR EXTENSIONS TO THE FOREGOING.

Approved by the Lieutenant-Governor-in-Council on the 5th day of October, 1914.

SECTION A

An application for the approval of a sewerage system shall be accompanied by:

(1) A topographical map covering the entire municipality or sewerage district, together with contours indicating the nature of the adjoining watershed. This map shall clearly show the existing, proposed and ultimate main sewers intended for the area. The sizes of sewers must be plainly written along the lines of the sewerage system.

12"

0

(2) Profiles of all sewers proposed for immediate construction, which shall show by means of figures and other suitable symbols the sizes, lengths, gradients, surface elevations of the sewer invert, elevation of sewer inverts at manholes and the material and nature of the sewer construction. Gradients ensuring self-cleansing velocities will be expected when obtainable by the nature of the topography of the section to be sewered. It is further required that the elevation of the floor of the lowest cellar be mentioned on the profile drawing. Test hole information showing character of subsoil and such other information necessary to aid contractors in bidding will be required for new sewerage systems, new sub-divisions and for larger undertakings. Test hole information is not required for small jobs where the nature of the sub-stratum is known.

(3) Plans of all sewer appurtenances, such as manholes, lampholes, flush tanks, siphons, unusual features, pumps, etc., shall be required. It is suggested that details of manholes, flush tanks, catch basins, etc., be placed on the profile drawing or that they be standardized and bound together with the standard specifications.

(4) Specifications or allusions to a Standard Specification already filed with the Board, together with a copy of the Engineer's preliminary estimates of cost subdivided into the various main headings, shall be required.

(5) Further the Corporation shall produce evidence that by-laws either have been passed or will be passed forthwith, providing that all outhouses and privies shall be removed or destroyed on those premises abutting on streets which have sewerage facilities or upon those premises which by reason of their situation may connect to existing sewers, and that such premises are required to connect to the adjacent sewer.

SECTION B

An application for the approval of common sewers or sewer extensions shall be accompanied by:

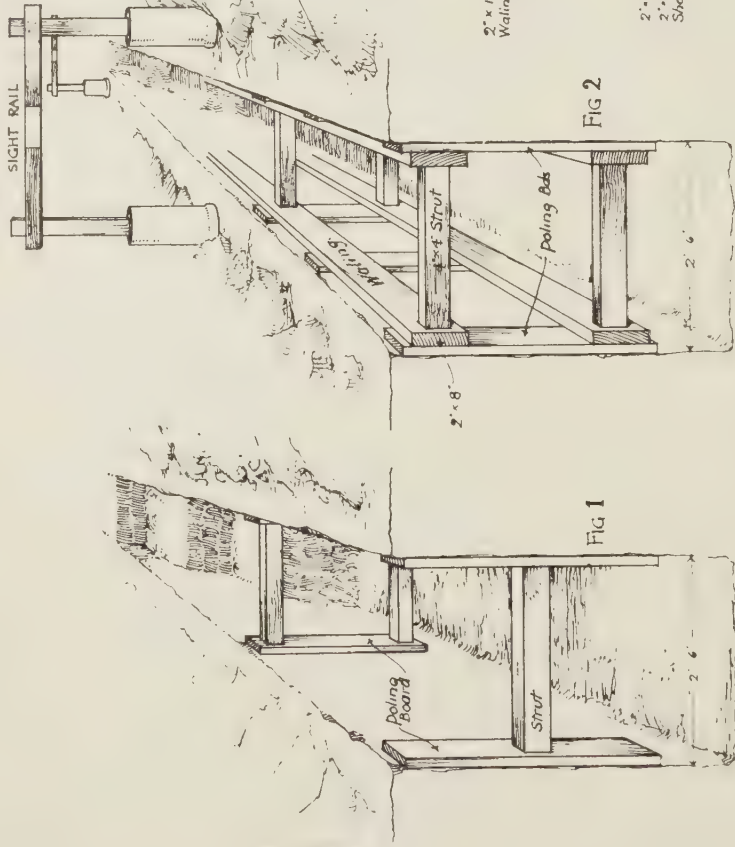
(1) Plans and specifications or plans together with an allusion to a standard specification previously submitted as required for subsections 2, 3, and 4 of Section (a), relating to the particular extension. It is suggested that when several profiles are being submitted at one time these be blue-printed on a single, long sheet, instead of in sections. (Filing and examination is thereby much simplified.)

(2) A report in the case of new outlets showing their relation to the existing system and setting forth the reason why existing outlets are not used.

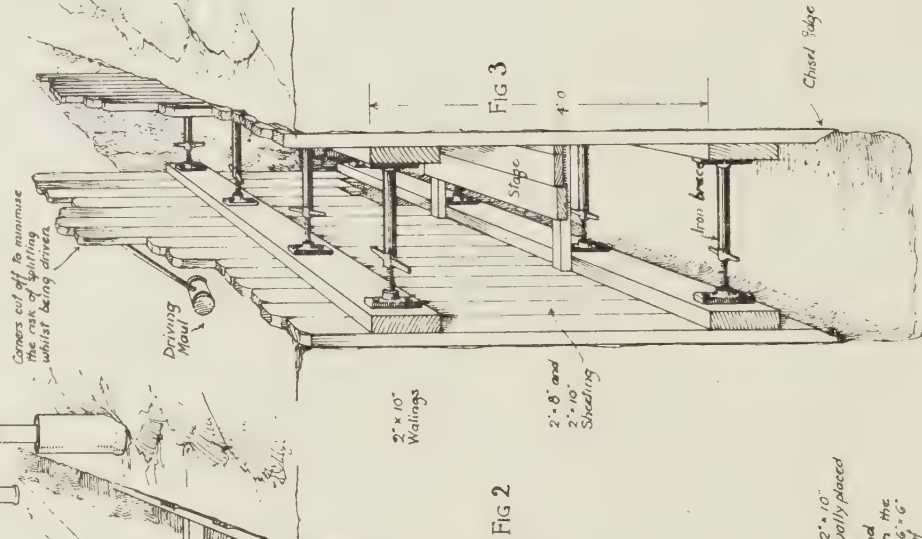
SECTION C

An application for the approval of a sewage disposal works shall be accompanied by:

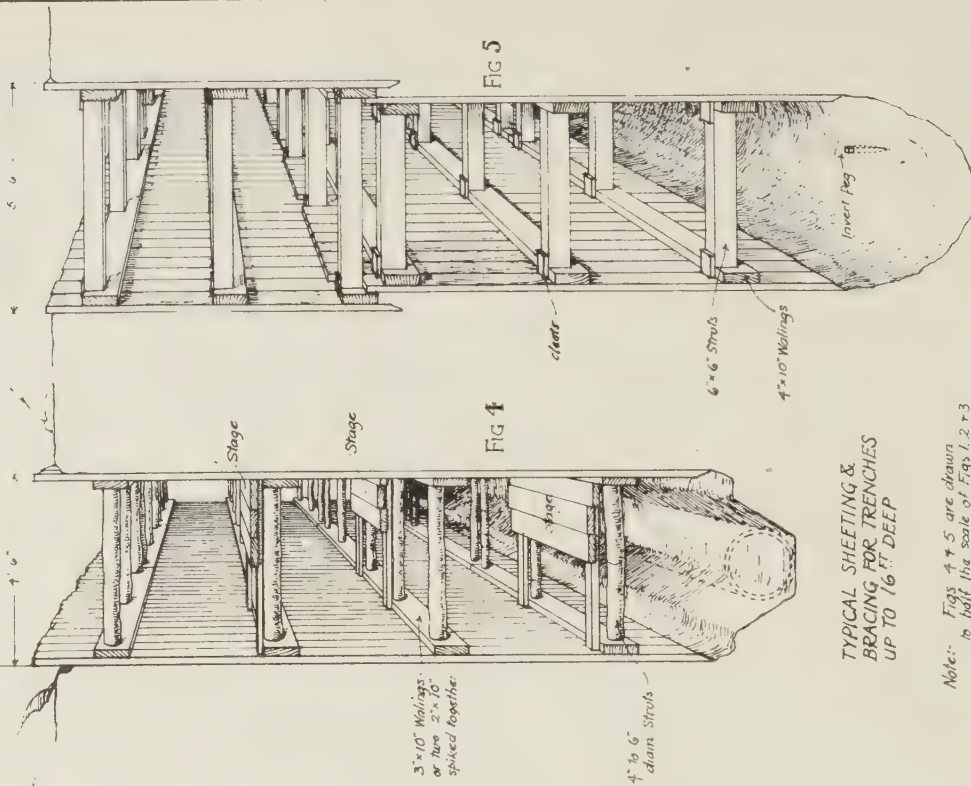
SHORING OF TRENCHES.



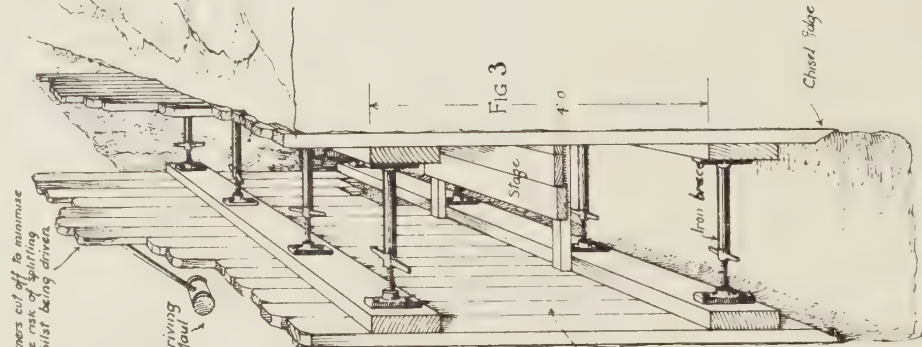
NARROW TRENCH IN FIRM GROUND
Shewing Single & Double Struts



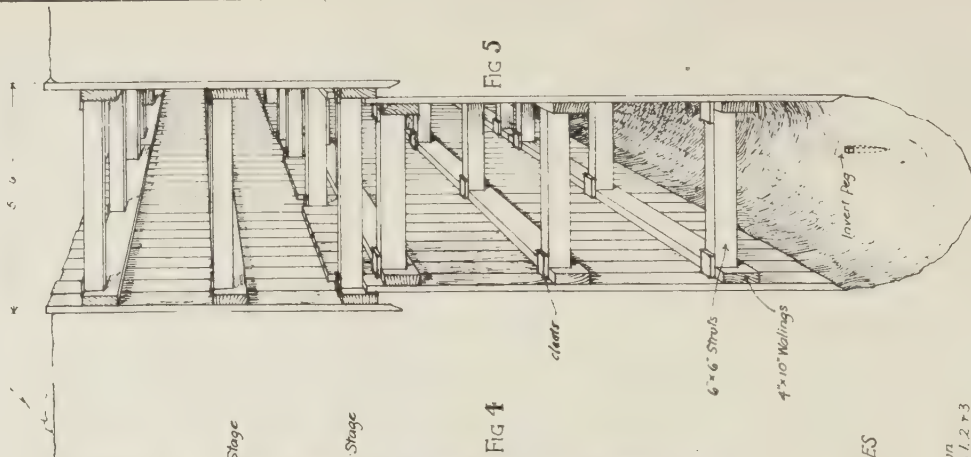
NARROW TRENCH IN MODERATELY FIRM GROUND
Shewing open Piling Boards, Walings & Struts



TYPICAL SHEETING & BRACING FOR TRENCHES UP TO 16 FT DEEP



NARROW TRENCH IN LOOSE SAND
Shewing Close Vertical Sheet Piling Walings & Iron Screw braces



TYPICAL SHEETING & BRACING FOR TRENCHES UP TO 16 FT DEEP

TRENCH IN LOOSE SOIL 16 FT DEEP & OVER IN TWO SETS OF SHEETING (Upper 8 ft, Lower 12 ft) in this case

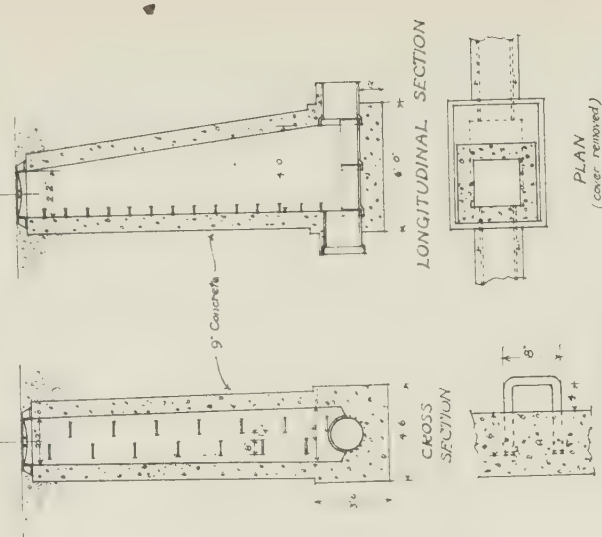
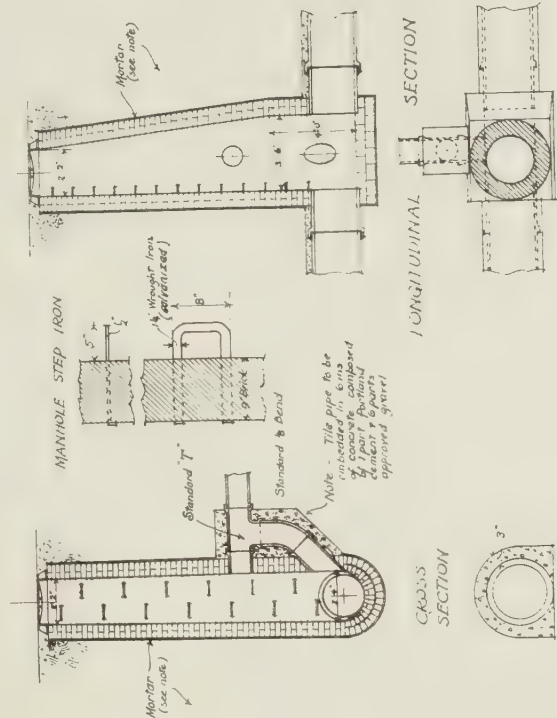
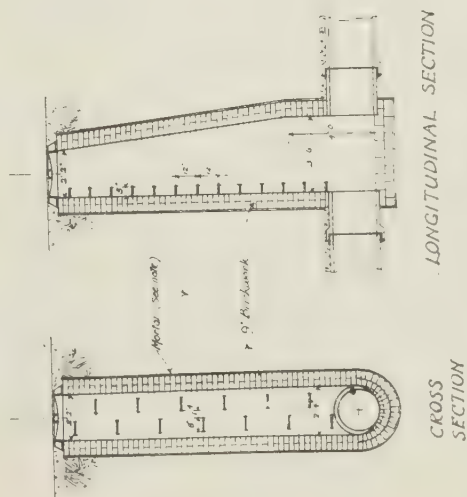
Notes - Piling boards are 14' x 8", 12' x 10" x 3' 0" long. Walings are 2' x 8", 2' x 10" & in the larger trenches 4' x 8", 4' x 10" etc. The first set of walings are usually placed 1' 0" below the ground & the succeeding lower sets at 6' 0" centres round Struts, also called Braces are 4' x 4", 6' x 6" or 8' x 8" & 6' x 6" diam round. They are placed 6' 0" apart horizontally & at points in walings, when the adjacent struts may be taken in conjunction with intermediate of 6' x 6". The struts may be further apart on account of the size & working of the ground.

Two sets of sheet piling could be used in shoring a trench 16' 0" deep (as Fig 4) and is preferable to one long set both on account of ease in withdrawing the smaller sheeting & general convenience.

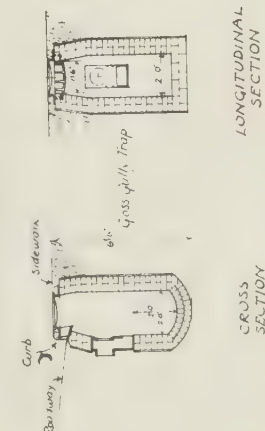
In materials which are likely to run the planking should be driven slightly ahead of the excavation.

STANDARD MANHOLES AND GULLIES IN BRICK AND CONCRETE.

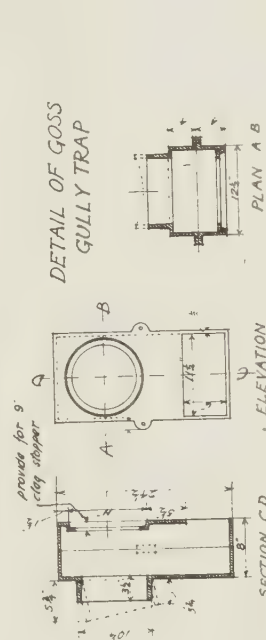
TYPICAL BRICK MANHOLE WITH DROP CONNECTION



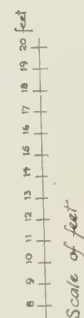
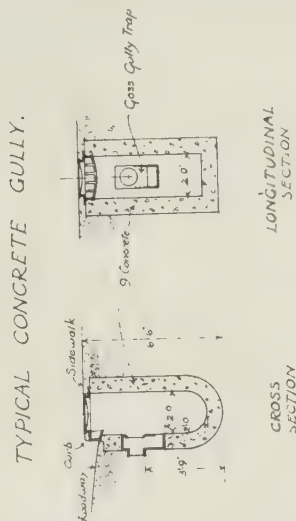
TYPICAL BRICK GULLY



DETAIL OF GOSS GULLY TRAP



TYPICAL CONCRETE GULLY.



(1) A small scale topographical map showing the main collectors, together with the situation and size of the disposal area.

(2) An Engineer's report upon the proposed works, describing the necessity thereof and the benefit to be derived therefrom.

(3) An actual estimation of the existing flow of sewage from various districts or at convenient outlets made by means of weirs or other suitable measuring devices must be included with the description of the works.

(4) Detail plans and specifications for the construction of the proposed works, together with the Engineer's preliminary estimate of cost.

(5) It is recommended that no disposal works other than the acquiring of land and the construction of sedimentation tanks be provided for at the time of construction of the main drainage scheme, but that suitable experiment and research be made as to the proper methods of disposal after actual conditions of flow have been established, the results from these experiments and researches being used in final design of the disposal works.

SECTION D

An application for the approval of combined systems or storm sewers shall be accompanied by:

(1) A set of topographical maps of the natural surface water drainage divisions of the municipality. These may be enlargements taken from the general topographical map, upon which shall be shown the proposed storm sewers. The sizes of the sewers must be plainly written along their lines of direction.

(2) Profiles, specifications and a plan showing typical sewer cross sections, man-holes, etc., for that portion of the system covered by the construction by-law.

(3) An Engineer's report of the proposed system, which report shall be in detail and shall include the information relating to sub-strata and ground water level, areas paved, nature of ground surface, local by-laws affecting collection and separation of roof water, mean slopes affecting run-off, and the area of each natural division, together with a complete record of data relating to precipitation affecting the municipality.

(4) A plan showing the locations of connections between the sanitary and storm sewers, together with a report upon the mean flow and its relation to the excess flow which operates the separating weir.

SECTION E

Completion of work:

(1) Upon completion of the work a revised plan showing the alterations and deviations from the original plans, together with a final estimate of cost, shall be forwarded to the Board.



Stripping the surface loam off a clay field.



Stripping sewer-pipe clay near Hamilton, Ont.

THE MANUFACTURE OF VITRIFIED CLAY SEWER PIPE IN ONTARIO.

BY A. R. DUFF, ASSISTANT CHEMIST EXPERIMENTAL STATION.

* “The clays used in the manufacture of sewer pipe in Ontario are confined chiefly to the district east of Hamilton, principally in the vicinity of Waterdown station on the Grand Trunk Railway, the deposits probably covering an area of five or six square miles in extent.

**Location of
Sewer Pipe
Clay** “The clay is obtained from two sources in this locality, either the weathered and softened top of the Queenston (formerly known as Medina) shale, which occurs mostly in knolls and ridges north of the railway, or from a transported clay, consisting chiefly of this material, which has been washed down to lower levels south of the railway line.

“The weathering action of the shale is twofold; softening and leaching. The softening increases the plasticity of the shale very considerably, the leaching decreases the lime content.

“Both processes are essential in producing a clay for sewer pipe, as smoothness of surface and the ability to take a salt glaze are obtained by using the weathered clay. These qualities could not be obtained in the finished product by using the hard unweathered shale.

“Weathering action must have taken many centuries to soften the shale and leach out sufficient lime to make these top layers suitable for sewer pipe manufacture. There is no known artificial method for either rapidly or economically bringing about the desired condition.”

The weathered in situ is found overlying the hard shale in a sheet from one to four feet or more in thickness, being thicker in depressions or on level ground, and thinner on sloping ground or knolls. Even on level ground the surface of the hard shale underlying the clay is irregular, so that in some places the amount of clay to be obtained is greater than in others.

“The transported clay is found over a considerable stretch of ground, principally south of the railway line. Many of the fields here are already stripped of clay and returned to cultivation of crops. A section showing the series of beds general to the locality is exposed in the clay pit worked by the National Fire Proof Company. It consists of about four feet of stiff, plastic, reddish clay, underlaid by about two feet of brownish sand. The sand is underlain by about three or four feet of alternating clay and silt layers to the bottom of the pit, with gravel and stony clay below. The upper four feet only is used for sewer pipe, silo blocks or other salt glazed goods. It strongly resembles the softened shale on the higher levels north of the railway track, from which it most probably has been derived.

“The clay in both places runs somewhat uneven in character, the best quality being red or brown, with a slight waxy lustre when freshly dug. It breaks up into small cubes and is exceedingly smooth and highly plastic when wet. A less plastic clay, of lighter colour, which crumbles finely on pressure between the fingers, occurs in small quantities throughout the stiff clay.

“The sewer pipe clay is liable to contain certain impurities, such as small pebbles of limestone, or streaks and lenses of sand and silty clay having a high lime content. These impurities are harmful, as the limestone pebbles burning to quick-lime cause soft white spots on the pipe, and the sand or silt, if present in any appreciable quantity, decreases the working qualities of the clay in the raw state and prevents the formation of a salt glaze, at the final stage of manufacture.

*An extract from the report on Clays of Ontario by Joseph Keele, Dominion Government Ceramic Engineer.

“ The gathering of clay in the field is one of the most important stages in the successful manufacture of sewer pipe in this district.

“ The method of winning clay is as follows: The surface sod is removed by scrapers after a shallow plowing. This is followed by a deeper plowing, and the clay thus loosened is shovelled into carts.

“ The carts are hauled to a raised platform alongside the nearest railway siding and dumped into coal cars, three of which provide the average daily allowance for a factory. The clay deposited is plowed downward until all the weathered clay is exhausted, and then the field is abandoned. The foreman in charge of the operation watches the changes that occur in the character of the clay as the plowing proceeds downward. He is provided with a bottle of acid for the purpose of testing doubtful clay. If a few drops of acid poured on the doubtful clay produces effervescence it is generally rejected. It is often impossible to prevent some doubtful clay from going into the cars owing to the uneven thickness of the weathered portion, or to exclude patches of limey clay.”

It is suggested that if exposed surfaces are allowed to weather for several days before winning a clear demarcation is shown between clay and high lime streaks which can readily be taken advantage of.

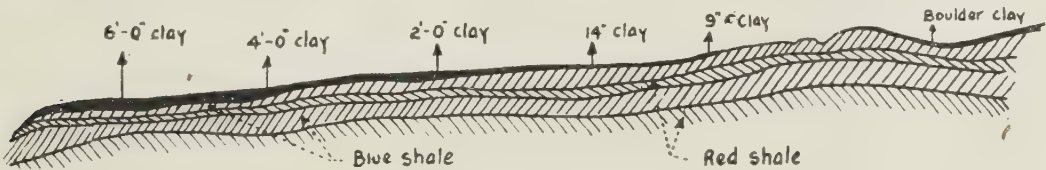
ANALYSIS OF SEVERAL SEWER PIPE CLAY FIELDS SHOWING POSITION OF HIGH LIME CLAY.

TABLE No. 6.

No.	Depth of Sample.	Lime Content.		
		Location (1)	Location (2)	Location (3)
1	Top 6 inches.....	None	1.05	Trace
2	6 " to 12 inches	Trace	1.05	.....
3	2 feet	0.49	2.25	0.5
4	2 " 6 inches.....	0.71	.....	.....
5	3 " 6 "	2.00	13.0	1.1
6	4 " 0 "	2.9	12.5	0.9
7	5 " 6 " shale.....	7.2	.....	3.5
8	25 " shale	7.2	.....	.....

Field Work—Mr. DUFF.

A typical cross section of fields which are being stripped of sewer pipe clay.



Only the dark portion and for the indicated depths is suitable for sewer pipe industry.

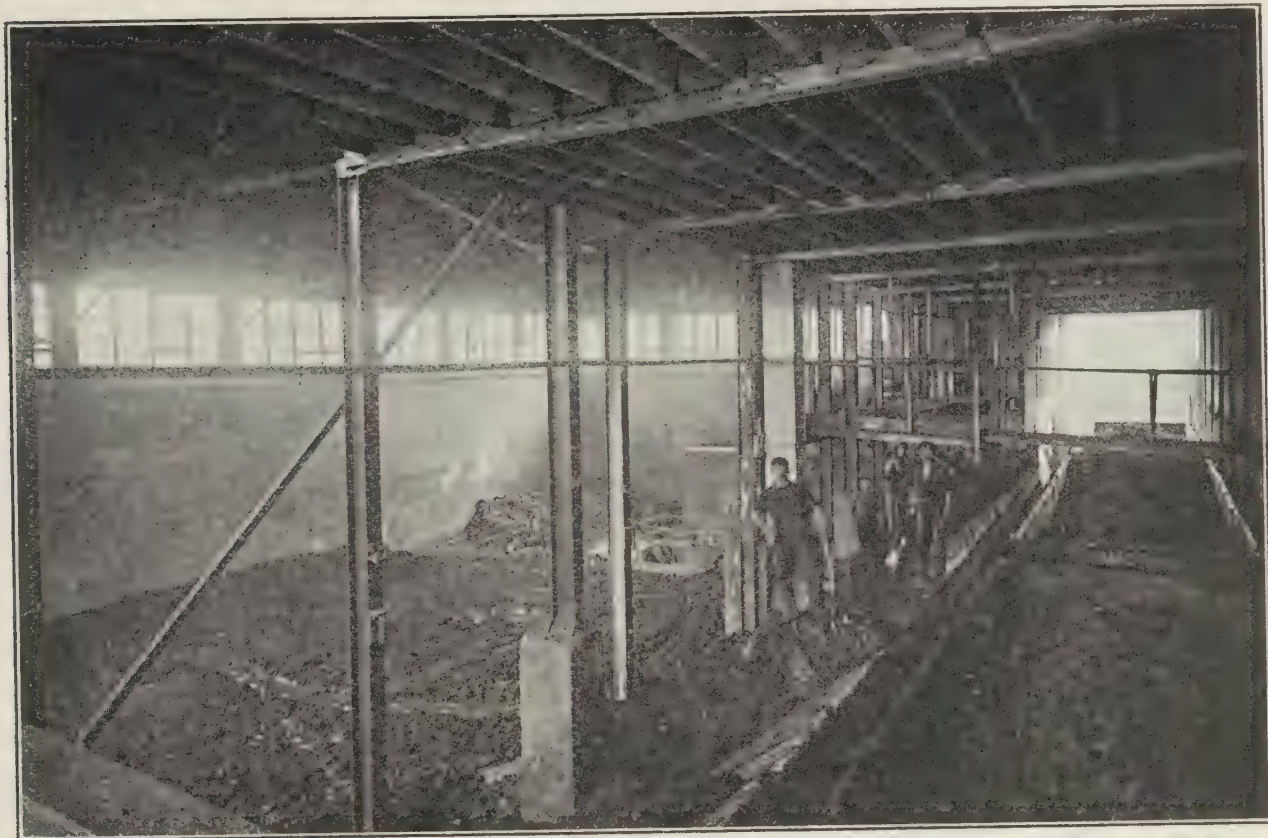
The sewer pipe clay is a mixture of the weathered blue and red shale and sand.



The clay is transported from field to factory by railway.



Clay fields, showing gathering of the lower high-lime clay used for hollow building blocks. National Fire Proofing Co., Ltd., pit.



Clay storage and receiving room. Toronto-Hamilton Sewer Pipe Co., Ltd.



Clay storage room, showing dry-pan, Hamilton factory.

TABLE No. 7.

*Analysis of Sewer Pipe Clay, Ontario.

Sample.	Silica per cent.	Alumina per cent.	Ferrie- oxide per cent.	Lime per cent.	Magnesia per cent.	Sodium per cent.	Potassium per cent.	Sulphur Trioxide per cent.	Loss by heat %
Red-burning Medina shale	65.04	16.14	6.37	.80	2.17	.64	3.21	.12	5.98

Waterdown, Ontario.

The clay as it comes from the fields contains considerable moisture depending on weather conditions. To pass the clay through the screens it is necessary to have it quite dry (not more than 10 per cent. moisture) and for this purpose a large drying floor built of concrete and heated by steam pipes is provided. When the clay reaches the factory it is shovelled to a sloping platform and slides to the drying floor. Here it is distributed evenly from the floor, each successive car or shipment making a fresh layer or lamina over the others. The dried clay is dug in perpendicular sections from these laminae of different shipments and so aids in the mixing of the clay. All operations from the field to the pipe presses help to insure a thorough mixing of the clay and a more uniform quality of product from the factory.

Belt conveyers take the clay from the drying floor to the dry pans where the clay is ground very fine. It then falls through the perforations of the pans after which it is elevated and made to fall over piano wire screens set about ten to the inch. That which goes through the screen is elevated to a storage hopper and the coarser material chutes back to the dry pan to be reground.

The wetting or tempering of the clay is the next step in the process. This is done in a grinding and mixing pan—commonly called the wet pan or tempering pan—the bottom of which is not perforated. The tempering pan is fed from the storage hopper with dry ground clay. Water is added to each charge and the

Tempering
pan

mixing continues until the clay has the correct plasticity. It is then spaded from the constantly revolving pan to a belt which conveys the carefully prepared material to a hopper situated over or near the pipe press. This prepared clay cannot be stored in large quantities because its water content is liable to change due to evaporation. The behaviour of the clay in the pipe press is largely dependent upon a variation not greater than 1½ per cent. in its water content. If too much water is added the clay will leave the press in a very smooth condition, but will not have sufficient strength to permit of handling on the drying floor. On the other hand if insufficient water is added the clay is not sufficiently plastic and does not go through the die readily and is apt to cause laminations in the pipe.

The usual procedure in adding the water to the ground clay is as follows:

The wet pan which is 7 feet in diameter and about 18 inches deep revolves continuously. Dry clay (about 10 per cent. moisture) is added by drawing a slide in the clay chute. At the same time water is added from a 1½-inch pipe. When the operator sees enough clay has been added he closes the clay chute and shuts off the water. Very heavy steel crushing rolls rest on the bottom of the pan and are caused to rotate by the moving pan. Stationary guides scrape on the pan surface and throw the clay under the heavy rollers.

Tempering
the clay

*Report of the Bureau of Mines, Part II Ontario, 1916. Clay and the Clay Industry of Ontario.

The action is to crush the clay and mix in the water. The workman catches a handful of the material and by squeezing it in his hand decides whether the mix is too soft or too stiff and he adds water or dry clay as required. If he is not judging correctly the man at the press signals that the mix is too stiff or too soft and the temper-pan man changes the consistency accordingly. The man at the wet pan becomes very expert at judging the moisture content by the feel of the clay.

For very large pipe the clay is required not so stiff as for smaller sizes. The reason of this is that when pressing 24-inch pipe a very large cross section of clay is pressed through the die and the clay must be soft enough to pass through with the available pressure behind it. It must, however, be stiff and strong enough to hold a weight of four or five hundred pounds during the interval between when the pipe has been pressed out to its full length and when the revolving cutter severs its connection from the clay in the press and transfers the weight of the pipe to the platform below.

The small 4-inch pipe can and must be stiffer. There is a much greater available pressure for the small sizes. The steam piston 40 inches in diameter has a pressure of 120 pounds per square inch behind it and in the clay cylinder with a piston 18 inches in diameter there is a pressure of approximately 590 pounds per square inch. The lower end of the clay cylinder and entry to the 4-inch die is conical and so the pressure on the clay passing through the 4-inch die may be 600 pounds per square inch or more.

On the 24-inch pipe a 21-inch dia. clay cylinder with a pressure on its piston surface of 473 pounds supplies the clay for a 24-inch die and so the pressure on the clay passing through a 24-inch die may be less than 350 pounds per square inch.

These figures are based on a gauge reading of 120 pounds, the 24-inch press has a 44-inch steam cylinder and a 21-inch clay cylinder. The 4-inch or smaller press has a steam cylinder 40 inch diameter and a clay cylinder 18 inches in diameter.

The 4-inch pipe are thin walled, are as long as the 24-inch pipe and are more apt to bend and warp in handling. The extra pressure available at the press for small pipe permits of a stiffer mix.

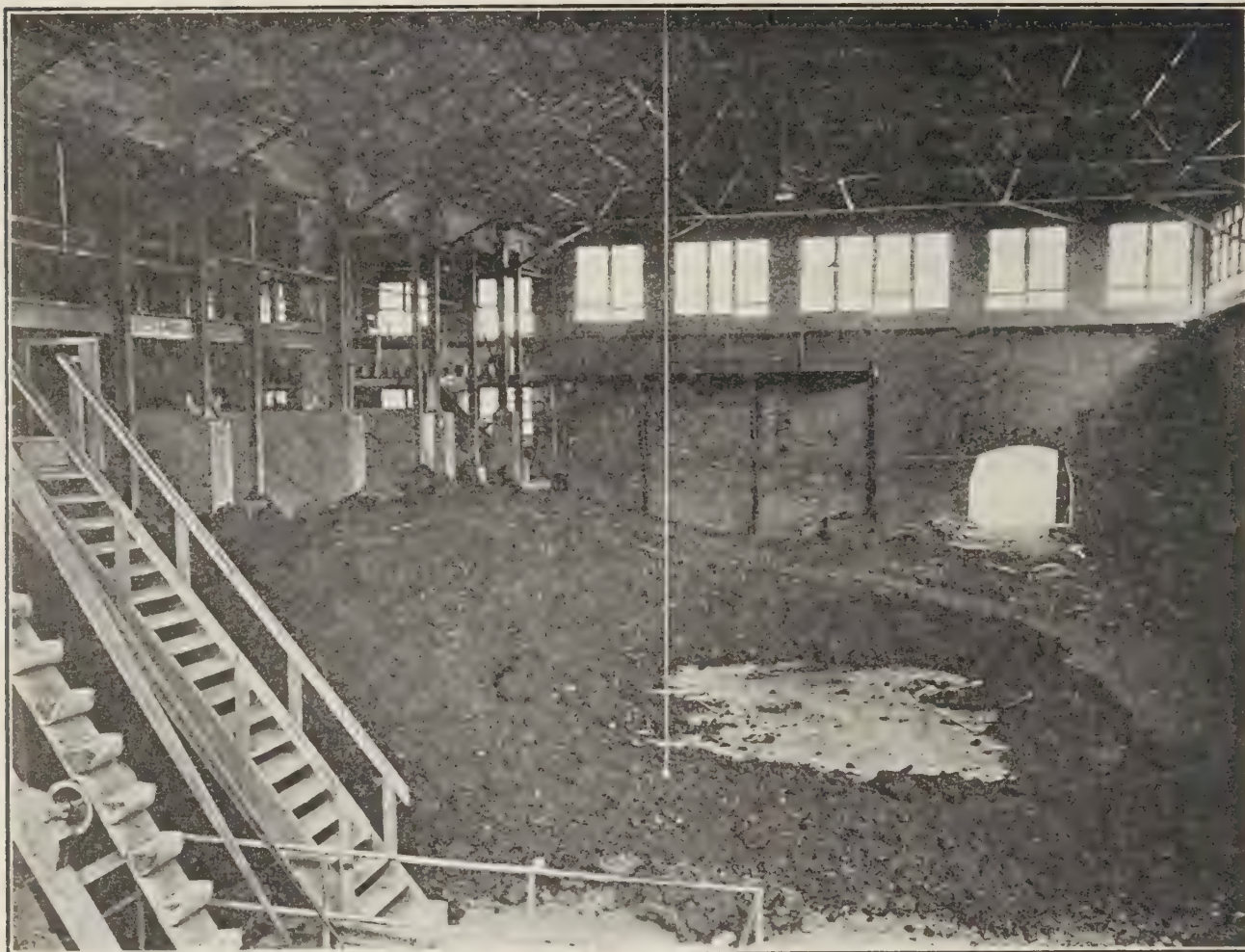
The factory executives may be fortunate in securing a man or men of careful judgment for operating their tempering pans, but with constantly changing workmen the safest method of controlling the proportion of water in the tempered clay would be to use some instrument or machine that would give an accurate measure of the behaviour of the water content. Such a machine would not need to be used for every mix but as a check on the man's judgment.

The workman in testing for moisture takes a lump of mixed material and squeezes it in one hand. The clay gives under the pressure and moves out in places where no pressure is on its surface. The workman must remember each time how hard he had to squeeze last time or the day or week before.

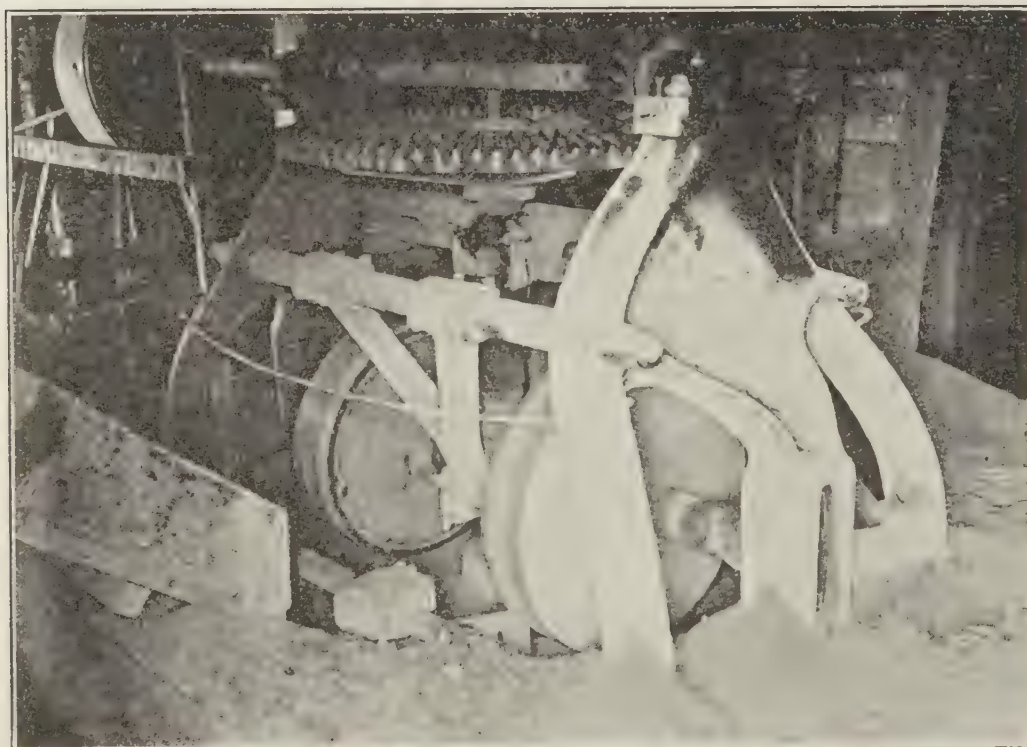
Now if the clay were held in a container and subjected to the pressure of a plunger or needle the plunger being quite heavy and a constant weight, the distance penetrated by the plunger would be a measure of the moisture content.

This could be compared with the lump of clay held in the workman's hand. He squeezes it. One might say the fingers were acting as a container and the workman was measuring the force necessary to press his thumb into the clay a certain distance. We could replace the thumb by a plunger, the fingers by a cup and measure the distance a constant pressure would press the plunger into the clay in a given interval of time.

**Testing
moisture
content**



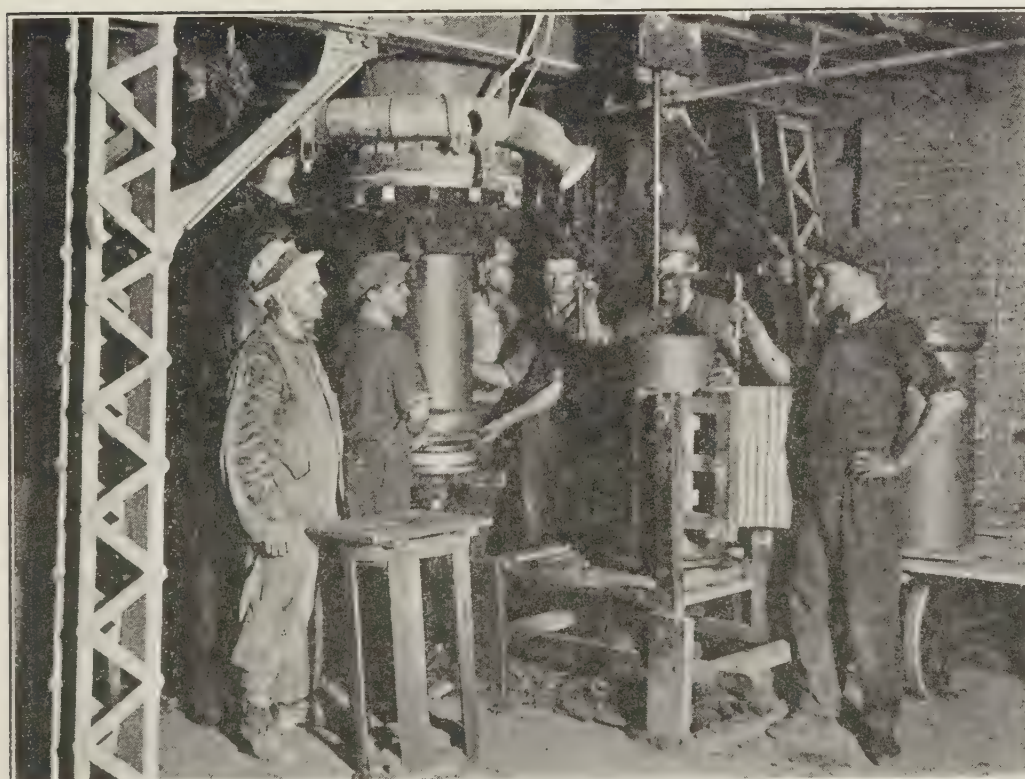
Clay storage room, Hamilton, Ont.



Dry Pan, Ontario Sewer Pipe Co., Ltd.

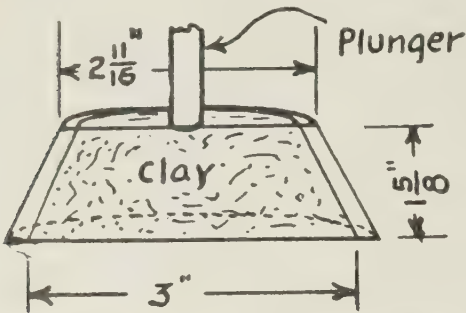


Sewer Pipe press, Dominion Sewer Pipe Co., Ltd., Swansea.



Sewer pipe press, Mimico, Ont.

An Olsen needle penetration machine was secured and a series of tests were made to determine the relation between penetration and moisture contents. The experiments were as follows:



The clay is held in a mould 2 11-16 in. x 3 in. x 15⁄8 in. The area of the surface of the moist clay briquette was 5.4 square inches. The area of the plunger surface 0.1176 square inches and the weight of the plunger 5 pounds.

In order to demonstrate the usefulness of this method of testing some sewer pipe clay was secured, dried at 220 degrees F. and mixed with different proportions of water. The clay sample was quickly homogenized by repeated slapping and doubling over on a slate surface. The oiled vulcanite ring was placed wide end up on a glass surface and the clay tightly packed

Laboratory Test into it. The mould and clay was then slid off the glass, turned over and placed under the needle. The needle was lowered until it barely touched the clay and clamped. Then with the weights on the plunger the clamp was released and the plunger left so for three minutes. The clamp was again tightened and a reading made on the scale, noting the penetration in three minutes. It was discovered that one could quite readily read a difference of one-quarter per cent. of water in the mix, i.e., the difference in penetration between samples containing 22.0 and 22.25 per cent. moisture was quite readable on the scale. and all samples containing 22.25 per cent. moisture gave a higher reading than any sample containing only 22.0 per cent. moisture.

Samples of tempered clay ready to go to the press were put in sealed containers and taken to the laboratory and tested. It was found that the workman's judgment was very good—see nos. 27 to 33 in table of penetrations.

Other experiments were made using the machine for measuring the ductility of bitumen. In this test the samples or briquettes all broke before a measurable distance had been indicated by the pointer on the machine.

TABLE NO. 8.

Sample No.	% Moisture added.	Wt. of Plunger in Exp.	Estimated Penetration for a 5 lb. plunger.	Duration of test.	% Loss of wt. during test	Remarks.
		2160 gms. or 4.52 lbs.				
1	15 %		0.33	3 mins.	2.5	Too dry to mix into a mass.
2	20.0	"	0.44	"	2.0	Very difficult.
3	20.0	"	1.5	"	1.5	"
4	21.0	"	1.4	"		Quite difficult.
5	21.0	"	1.8	"	1.5	"
6	21.5	"	1.8	"	1.5	"
7	21.5	"	2.4	"	1.5	Difficult to mix.
8	22.0	"	3.0	"	1.25	"
9	22.0	"	2.9	"	1.0	"
10	22.0	"	4.1	"	1.25	Correct moisture inside these limits.
11	22.25	"	3.7	"	1.0	
12	22.25	"	4.0	"	1.0	
13	22.25	"	4.2	"	1.5	Not difficult to mix.
14	22.5	"	4.5	"	1.0	"
15	22.5	"	4.6	"	1.0	"
16	22.5	"	5.6	"	1.25	"
17	22.75	"	6.5	"	1.0	"
18	23.0	"	5.9	"	1.6	"
19	23.0	"				

TABLE No. 8.—Continued.

Sample No.	% Moisture added.	Wt. of Plunger in Exp.	Estimated Penetration for a 5 lb. plunger.	Duration of test.	% Loss of wt. during test	Remarks.
		2,160 gms. or 4.52 lbs.				
20	23.25		6.1	3 mins	1.25	Not difficult to mix.
21	23.5	“	6.7	“	1.25	“ “
22	24.0	“	10.0	“	1.0	“ “
23	24.5	“	10.1	“	1.0	“ “
24	25.0	“	12.2	“	1.25	“ “
25	25.0	“	12.7	“	1.0	“ “
26	30.0	“	.....	10 sec's.	.....	Penetrated right through plague in 10 secs. Soft mix.
27	.....	“	3.1	3 mins.	.....	Samples from wet pan of Dom. S.P. factory.
28	.....	“	2.9	“	.....	“ “
29	.....	“	3.1	“	.....	“ “
30	.....	“	2.2	“	.....	“ “
31	.....	“	2.3	“	.....	“ “
32	.....	“	2.2	“	.....	“ “
33	.....	“	2.5	“	.....	“ “
34	.....	“	2.3	“	.....	Dom. factory another day.
35	.....	“	2.9	“	.....	“ “
36	.....	“	2.9	“	.....	Ontario S.P. factory wet pans.

Plasticity is the property of changing form without rupture of surface, that is, of yielding to pressure and of retaining the new form when the pressure is removed. It is the property in tempered clay which gives an easy flow through the die and which makes it possible to press it into the various forms and sizes of sewer pipe.

Various explanations are given for plasticity in clays. It is known that fine grinding increases the plasticity of a clay and yet fineness of grain alone will not give plasticity. Finely ground quartz, glass, etc., are only slightly plastic when wet and are “short,” i.e., have very little cohesion. Each particle is held apart by a film of water and under pressure these particles will, to a slight extent, slide past each other and permit of deformation of shape without rupture. On drying, however, the water disappears, there is no longer any cohesion between the particles and any pressure breaks up the moulded sample.

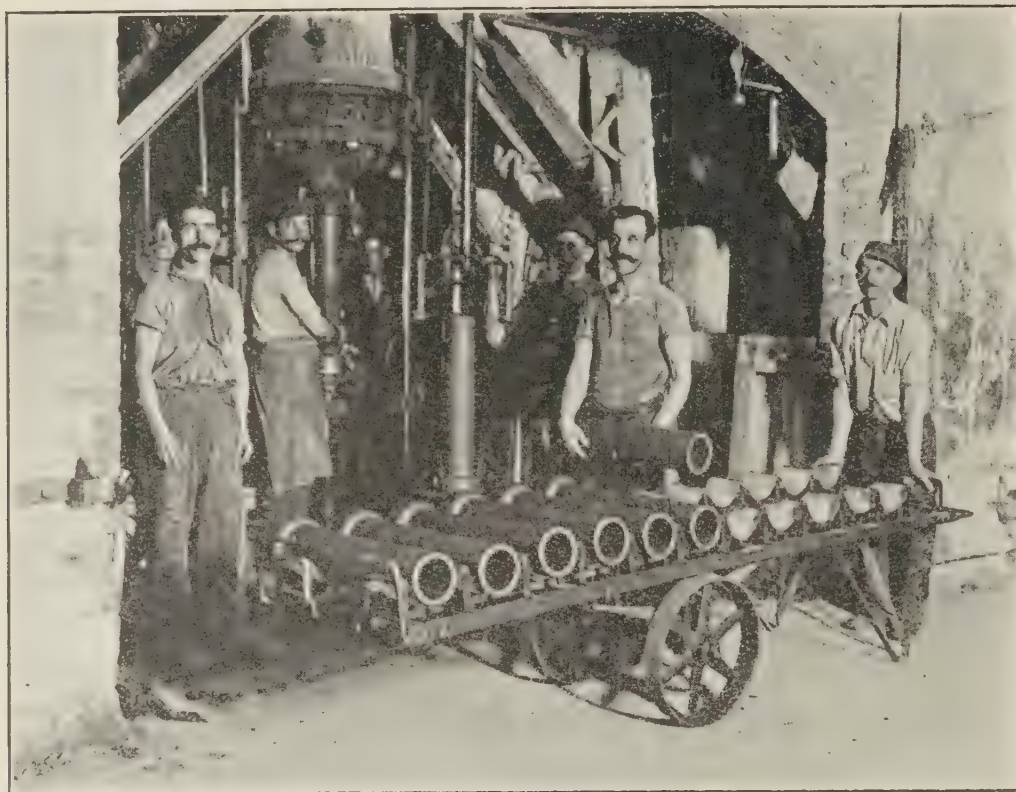
Clays are plastic and have a greater retention or capillary attraction for water than non-plastic material such as grains of sand, and, therefore, the clay grains might be said to be surrounded by a greater film of water than sand grains.

It appears that the water retained in the clay takes on colloid properties and affords a gelatinous coating to the grains which permits of a change of form without loss of close contact of the particles. Colloidal substances are also present in clay.

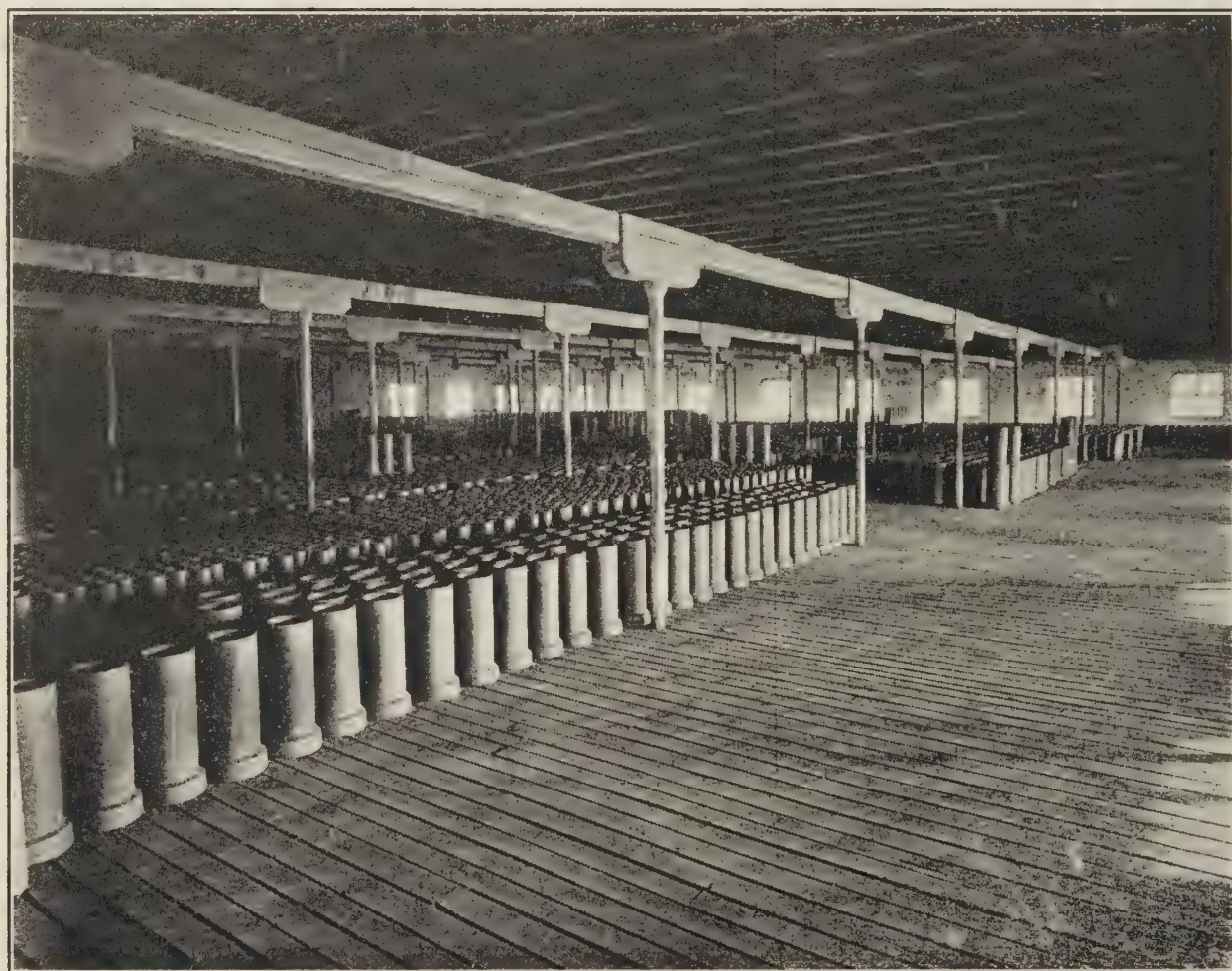
Finer grinding increases the colloidal properties of the clay and tends to make the non-colloidal grains smaller and increases the plasticity. The burning of the clay destroys the colloids and the property of plasticity, and ground burned clay is inert like sand.

The result of too much sand in clay is poor plasticity and a less smooth product from the press. It also lessens the cohesion in the clay of the wares on the drying floor and often causes cracking. The thinner part of the pipe or the

Effect of sand in clay wall of the bell dries and contracts more rapidly than the slower drying body of the pipe, and if the clay has not good cohesion the bell cracks. The lamination in the body of the pipe would also be greater and might result in slabbing and spalling in the kiln, i.e., steam would form



Sewer pipe press making 4-inch pipe, Hamilton, Ont.



Drying floor.



Drying floor, Hamilton, Ont.



Drying—half-completed pipe have been turned.

moisture or water of crystallization between the laminations and blow out in large blisters.

Ground burned clay is, however, often mixed with the clay from the store room and acts as grog to give more strength to the pipe when the temperature is near or at the point of vitrification.

The proportion of water in the clay is an important factor at the press. If the clay is too dry pressure may push it through but the friction against the sides of the die retards the outer layers more than the inner part and laminations are caused. These laminations may be disastrous later in the kiln when steam from moisture or water of crystallization forms between the layers and causes popping or slabbing.

On the other hand much water being present causes the clay to slide through the dies readily without laminations, makes the pipe too soft and plastic to be handled to the drying floor without collapsing or deforming.

The greatest possible percentage of water without weakening the pipe would be the ideal condition for compact homogeneous wares.

To obtain pipes that are compact, dense and capable of being handled before firing without deformation it is necessary to apply pressures ranging from 250 to 600 pounds per square inch as it leaves the press.

The sewer pipe press consists of two large cylinders and a die. To describe a typical unit the steam cylinder is 46 inches in diameter and has a piston with a 60-inch stroke. Directly under the steam cylinder is a clay cylinder which is from 18 to 24 inches in diameter. When the steam cylinder piston is fully raised the plunger is sufficiently above the clay cylinder to permit a charge of

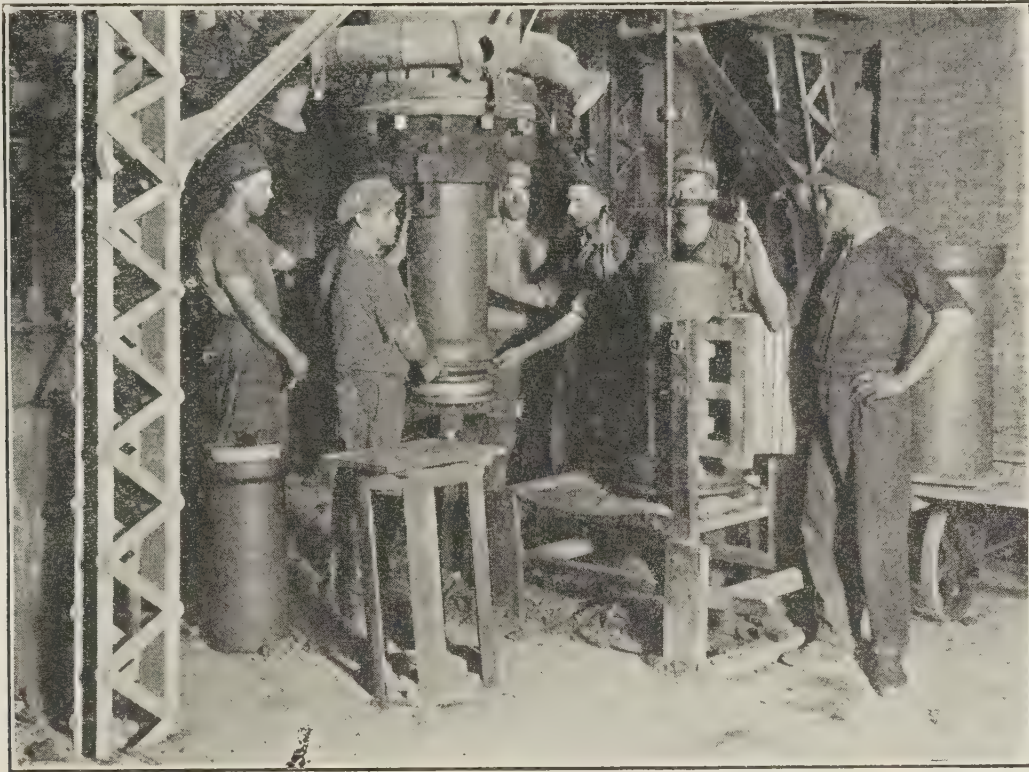
clay to chute in from a conveyer belt. The belt is stopped and the steam piston descends with a pressure behind it of 115 pounds per square inch. The lower clay piston head is only about one-quarter the area of the steam piston head and so the clay being shoved through the die is under a pressure of from 300 to 400 pounds per square inch. The die plate is securely fastened to the bottom of the clay cylinder. Inside is a steel cone and the clay is pressed between the cone and the outer circle of the die. The distance from the cone to the outer edge of the die decides the thickness of the pipe wall.

A piston from below, which is little more than counter-balanced by weight and which is operated by a foot lever, is permitted to rise. On it is the form or mould which makes the bell of the pipe. When the form reaches the die face it is clamped onto it and the steam piston is operated. Clay is pressed into this bell mould, the clamp lock is removed and the platform piston recedes as the body of the pipe is pressed through the die. When the pipe is long enough the steam pressure is cut off, a circular cutter is operated inside the die and the pipe is lifted to a small stand where it is wire cut to its correct length.

In adjusting the cutter and the dies, allowance is made for the 10 or 12 per cent. shrinkage the green clay undergoes on drying and burning so that the final product shall be of given size.

The bell if thinner than the body of the pipe dries more rapidly. The shrinkage from loss of water causes the outer rim to contract faster than the more moist body and when the clay lacks the necessary cohesion and strength the bell cracks. This might be overcome in the larger pipe by enriching the more doubtful sandy clays by adding some very plastic tough clay. Any pipe in which flaws develop are scrapped and returned to the raw clay drying floor.

Each pipe from the cutting platform is placed on a wooden pallet and carried on trucks to the drying floors where it is placed bell end up.



The presses and cutter, Mimico, Ont.

Immediately after placing the pipe on the floor workmen supplied with damp pads or pieces of canvas slick up any rough spots. A little more care **Slicking up** in this operation would go a long way towards producing a better looking pipe in Ontario.

Steam at low pressure circulates in pipes under the drying floors. The floor boards are placed about one-half inch apart and allow an even and free circulation of heat. It is very necessary to dry all sides of the pipe evenly, otherwise they may warp or even crack due to stresses set up in the pipe. When the bell end is nearly dry the pipes are turned over and left with the spigot end up till they are ready for the kilns. **Drying Floors**

Several drying floors were visited during the preparation of this report and it appears that no proper appreciation is had of the advantage of a careful control of drying floor temperature and air humidity. Chart No. 1 has been arranged to show the moisture of air when saturated for previous temperatures. It is to be observed that air at a temperature of 98 degrees Fahrenheit will contain three times the amount of water of air at temperature of 65 degrees Fahrenheit and nearly six times as much as air at a temperature of 30 degrees Fahrenheit, above 100 degrees Fahrenheit the increase in capacity to hold moisture is most striking.

*TABLE No. 9.

Relative Humidity Table.—Pressure=29.0 inches.

Difference between Dry and Wet Bulbs.
Relative Humidity.

Reading of Dry Bulb Thermometer.		1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	16°	17°	17.5°	18°	18.5°	19°	19.5°	20°	20.5°	21°
65	degrees	95	90	85	80	75	70	66	62	57	53	48	44	40	36	32	28	25	23	21	19	17	15	13	12	10
66	"	95	90	85	80	76	71	66	62	58	53	49	45	41	37	33	29	26	24	22	20	18	17	15	13	11
67	"	95	90	85	80	76	72	67	62	58	54	50	46	42	38	34	30	27	25	23	21	20	18	16	14	13
68	"	95	90	85	81	77	72	68	64	59	55	51	47	43	40	36	32	29	27	25	23	22	20	19	17	15
69	"	95	90	86	81	77	72	68	64	60	56	52	48	44	40	37	33	30	28	26	24	23	21	20	18	17
70	"	95	90	86	81	77	73	69	64	60	56	53	49	45	41	38	34	31	29	27	26	24	23	21	19	18
71	"	95	91	86	81	77	73	69	65	61	57	53	49	46	42	39	35	32	30	28	27	25	24	22	20	19
72	"	95	91	86	82	78	73	69	65	61	58	54	50	46	43	40	36	33	31	29	28	26	25	23	21	20
73	"	95	91	86	82	78	74	70	66	62	58	54	51	47	44	40	37	34	32	30	29	27	26	24	22	21
74	"	95	91	86	82	78	74	70	66	63	59	55	51	48	44	41	38	34	33	31	30	28	27	25	23	22
75	"	96	91	87	82	78	74	70	67	63	59	55	52	48	45	42	38	35	34	32	31	29	28	26	24	23
76	"	96	91	87	83	78	74	70	67	63	59	56	52	49	46	42	39	36	34	33	31	30	28	27	25	24
77	"	96	91	87	83	79	75	71	67	63	60	56	53	49	46	42	39	37	35	34	32	31	29	28	26	25
78	"	96	91	87	83	79	75	71	67	64	60	57	54	50	46	43	40	37	36	34	33	31	30	28	27	26
79	"	96	91	87	83	79	76	72	68	64	60	57	54	51	47	44	41	38	37	35	34	32	31	29	28	27
80	"	96	91	87	83	79	76	72	68	64	61	57	54	51	47	44	41	38	37	36	34	33	31	30	28	27
81	"	96	91	87	83	79	76	72	69	65	62	58	55	52	49	46	43	40	39	37	36	34	33	31	29	28
82	"	96	92	88	84	80	76	72	69	65	62	58	55	52	49	46	43	41	39	38	36	35	33	32	30	28
83	"	96	92	88	84	80	77	73	70	66	63	59	56	53	50	47	44	42	40	39	37	36	34	33	31	30
84	"	96	92	88	85	81	77	74	71	67	64	60	57	54	51	48	45	43	41	40	38	37	35	34	32	31
85	"	96	92	88	85	81	78	74	71	67	64	61	58	55	52	49	46	44	42	41	39	38	36	35	33	32
86	"	96	92	89	85	81	78	75	71	68	65	62	59	56	53	50	47	45	43	42	40	39	37	36	34	33
87	"	96	92	89	85	82	78	75	72	69	65	62	59	57	54	51	48	46	44	43	41	40	38	37	35	34
88	"	96	92	89	86	82	79	76	73	70	66	63	60	57	54	51	48	46	45	43	42	40	39	37	36	35
89	"	96	93	89	86	82	79	76	73	70	67	64	61	58	55	52	49	47	46	44	43	41	40	38	37	36
90	"	96	93	89	86	82	79	76	73	70	67	64	61	58	55	52	49	47	46	44	43	41	40	38	37	36
91	"	96	93	89	86	82	79	76	73	70	67	64	61	58	55	52	49	47	46	44	43	41	40	38	37	36
92	"	96	93	89	86	82	79	76	73	70	67	64	61	58	55	52	49	47	46	44	43	41	40	38	37	36
93	"	96	93	89	86	82	79	76	73	70	67	64	61	58	55	52	49	47	46	44	43	41	40	38	37	36
94	"	96	93	89	86	82	79	76	73	70	67	64	61	58	55	52	49	47	46	44	43	41	40	38	37	36
95	"	96	93	89	86	82	79	76	73	70	67	64	61	58	55	52	49	47	46	44	43	41	40	38	37	36
96	"	96	93	89	86	82	79	76	73	70	67	64	61	58	55	52	49	47	46	44	43	41	40	38	37	36
97	"	96	93	89	86	82	79	76	73	70	67	64	61	58	55	52	49	47	46	44	43	41	40	38	37	36
98	"	96	93	89	86	82	79	76	73	70	67	64	61	58	55	52	49	47	46	44	43	41	40	38	37	36
99	"	96	93	89	86	82	79	76	73	70	67	64	61	58	55	52	49	47	46	44	43	41	40	38	37	36
100	"	96	93	89	86	82	79	76	73	70	67	64	61	58	55	52	49	47	46	44	43	41	40	38	37	36

*Psychrometric Tables, C. F. Marion U. S. Department of Agriculture.

*TABLE No. 10.—HEAT UNITS.

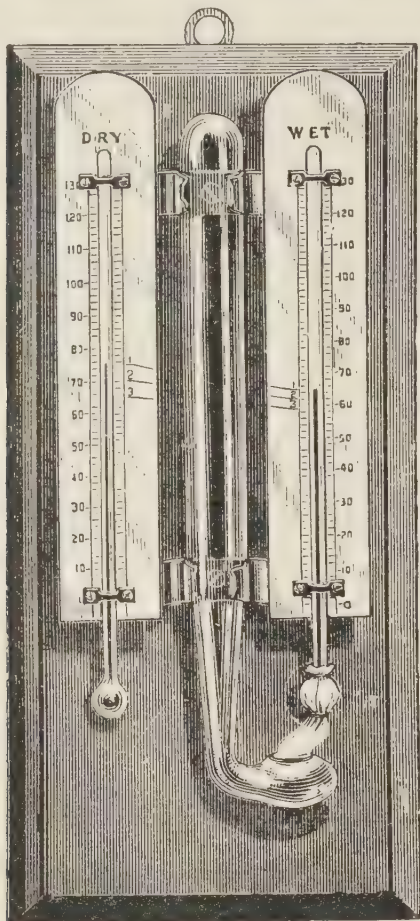
Evaporation of water.

Temperature. Degrees Fahrenheit.	Heat of the liquid.		Heat of vaporization.	
	Calories.	B.T.U.	Calories.	B.T.U.
32	0.00	0.0	595.4	1071.7
33.8	1.01	1.8	594.9	1070.8
35.6	2.02	3.6	594.4	1069.9
37.4	3.03	5.5	593.9	1069.0
39.2	4.03	7.3	593.3	1068.0
41	5.04	9.1	592.8	1067.1
42.8	6.04	10.9	592.3	1066.1
44.6	7.05	12.7	591.8	1065.2
46.4	8.05	14.5	591.2	1064.2
48.2	9.05	16.3	590.7	1063.3
50	10.06	18.1	590.2	1062.3
51.8	11.06	19.9	589.6	1061.3
53.6	12.06	21.7	589.1	1060.4
55.4	13.06	23.5	588.6	1059.4
57.2	14.06	25.3	588.1	1058.5
59	15.06	27.1	587.6	1057.6
60.8	16.06	28.9	587.0	1056.6
62.6	17.06	30.7	586.5	1055.7
64.4	18.06	32.5	585.9	1054.7
66.2	19.06	34.3	585.4	1053.8
68	20.06	36.1	584.9	1052.8
69.8	21.06	37.9	584.4	1051.9
71.6	22.06	39.7	583.9	1051.0
73.4	23.06	41.5	583.3	1050.0
75.2	24.06	43.3	582.8	1049.1
77	25.05	45.1	582.3	1048.1
78.8	26.05	46.9	581.8	1047.2
80.6	27.05	48.7	581.2	1046.2
82.4	28.05	50.5	580.7	1045.2
84.2	29.04	52.3	580.2	1044.3
86	30.04	54.1	579.6	1043.3
87.8	31.04	55.9	579.1	1042.4
89.6	32.04	57.7	578.6	1041.4
91.4	33.04	59.5	578.0	1040.4

*Arranged from Peabody "Steam and Entrophy tables."

In the rapid artificial or factory drying of ware, advantage is taken of the phenomena that is exhibited by the wet and dry bulb Hygrometers. A moist and dry body in the same room will have two different temperatures, the difference in temperature being both a measure of the rate of evaporation from the wet body and the relative humidity of the air. If the air is saturated no evaporation takes place and hence both bodies register the same temperature, and on the other hand when the wet body becomes

Humidity measured by Hygrometers



dry no evaporation can take place and hence same temperature is registered. The laboratory apparatus is quite simple and is as shown in the photograph. The relative humidity for temperature ranging from 65 degrees to 95 degrees Fahrenheit is shown in Table No. 9.

The difference in the temperature of the bulbs of the Hygrometer may be used to determine the heat required for the evaporation of the moist wares since the heat extracted which is shown by the difference of temperature is the heat used in evaporating the moisture.

To state a problem.

A drying floor 100 x 70 feet x 9 feet high, has on it an average of 80 lbs. of wet stock per square foot of floor area or approximately 230 tons of pipe.

The moisture content of the pipe = 22 per cent.

Temperature outside air = 50 degrees F.
relative humidity = 80 per cent.

It is required to find the amount of coal required (1) to dry the pipe and the air; (total heat required). (2) To determine the size of blower required for circulating air—assuming the stock requires to have 50 per cent. of the moisture reduced in three days.

To solve the problem some room temperature must be determined on—say 90 degrees F.

To find the amount of moisture 1,000 cubic feet of air at 90° F. will absorb:

Air introduced to heater 50° F. relative humidity 80% referring to Chart No. 1, 50° F.

Water content at saturation = .6 lbs per 1,000 cubic feet.

50° F. water content 80% saturation = .48 lbs. per 1,000 cubic feet.

In order to dry rapidly a dry atmosphere is essential, assume 72% at 90° F.

Water content at saturation = 2.25 lbs. per 1,000 cubic feet.

Water content 72% saturation = 1.62 lbs. per 1,000 cubic feet.

1.62 — .48 = 1.14.

Each 1,000 cubic feet of air taken in at 50° F. humidity 80% and raised to 90° F. and kept at 72% saturation will carry an extra 1.14 lbs. of water.

Total amount of moisture = 50% of total moisture = 11% of 230 tons = 25.3 tons or 50,600 pounds.

50,600 weight of water

1.14 capacity of each 1,000 cubic feet of air. = 43,400 x 1,000 cubic feet.

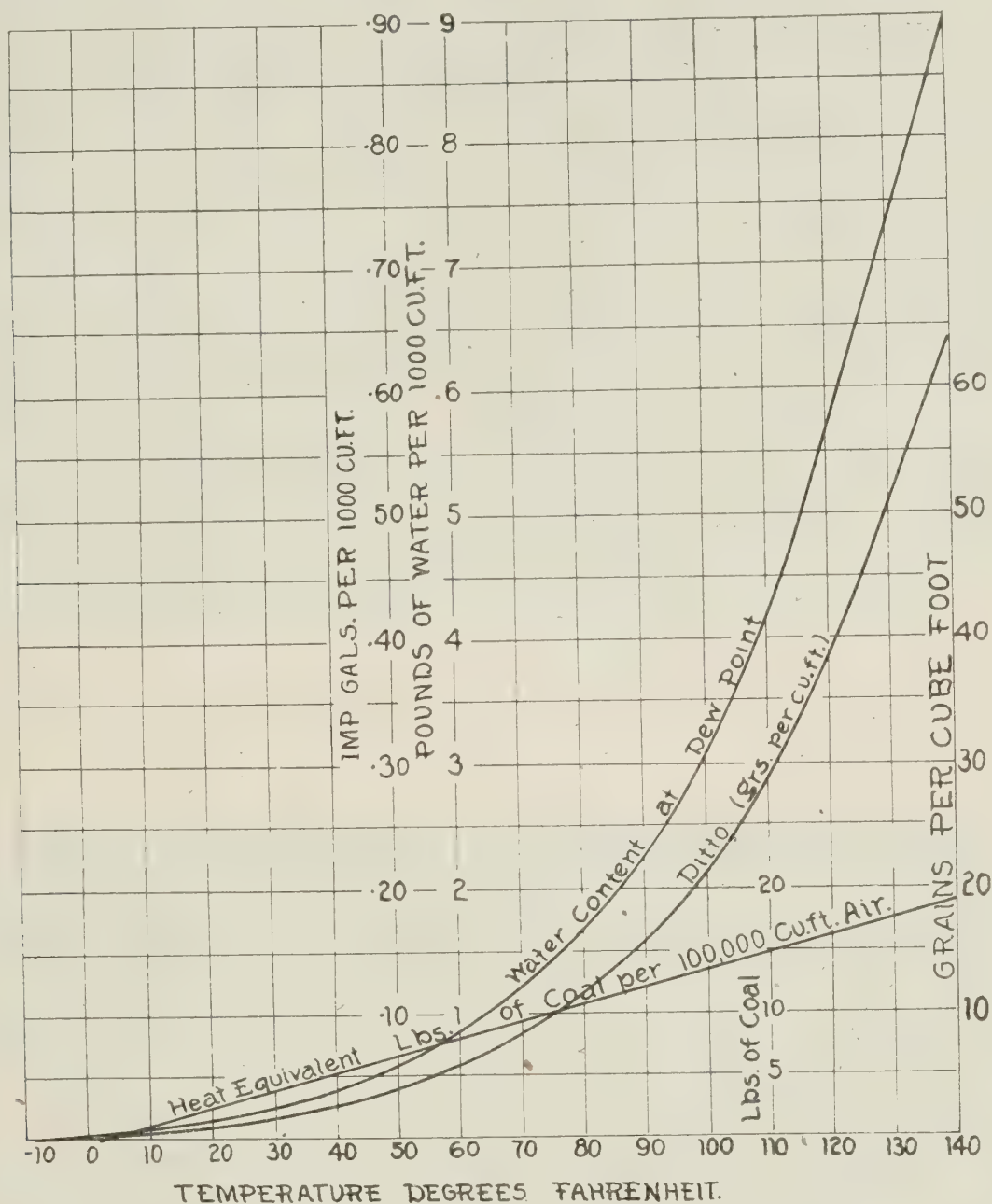
The room contains 63,000 cubic feet.

3 days are allowed for drying.

∴ capacity of blower must equal:

$$\frac{\text{Total volume cubic feet}}{\text{Number of minutes}} = \frac{43,400 \times 1,000}{4,320} = \text{approximately } 10,000 \text{ cu. ft. per minute.}$$

Such a blower would change the air of the drying room once in 6.3 minutes and would require about a 3 h.p. to operate.



Heat required for air 43,400,000 of air from 50° F. to 90° F. referring to Chart No.1.
 Heat equivalent 100,000 cubic feet air at 50° F. = 7 lbs. coal.
 Heat equivalent 100,000 cubic feet air at 90° F. = 12.5 lbs. coal.

require difference 5.5
 $434 \times 5.5 = 2,380 \text{ lbs.}$ Approximately 1 ton, 380 lbs.

Heat required for evaporation of the water.

Table No. 9 indicates the temperature of the wet pipe to be in the neighbourhood of 80° F. That is about 10° lower than the room temperature owing to the rate of evaporation. Referring to Table No. 10 at 80° F. the

Heat of evaporation = 1,046.2 B.T.U. per 1 lb. of water.

1 lb. of coal = approximately 13,000 B.T.U.

Therefore, 1 pound of coal will vapourize

12.4 lbs. of water assume

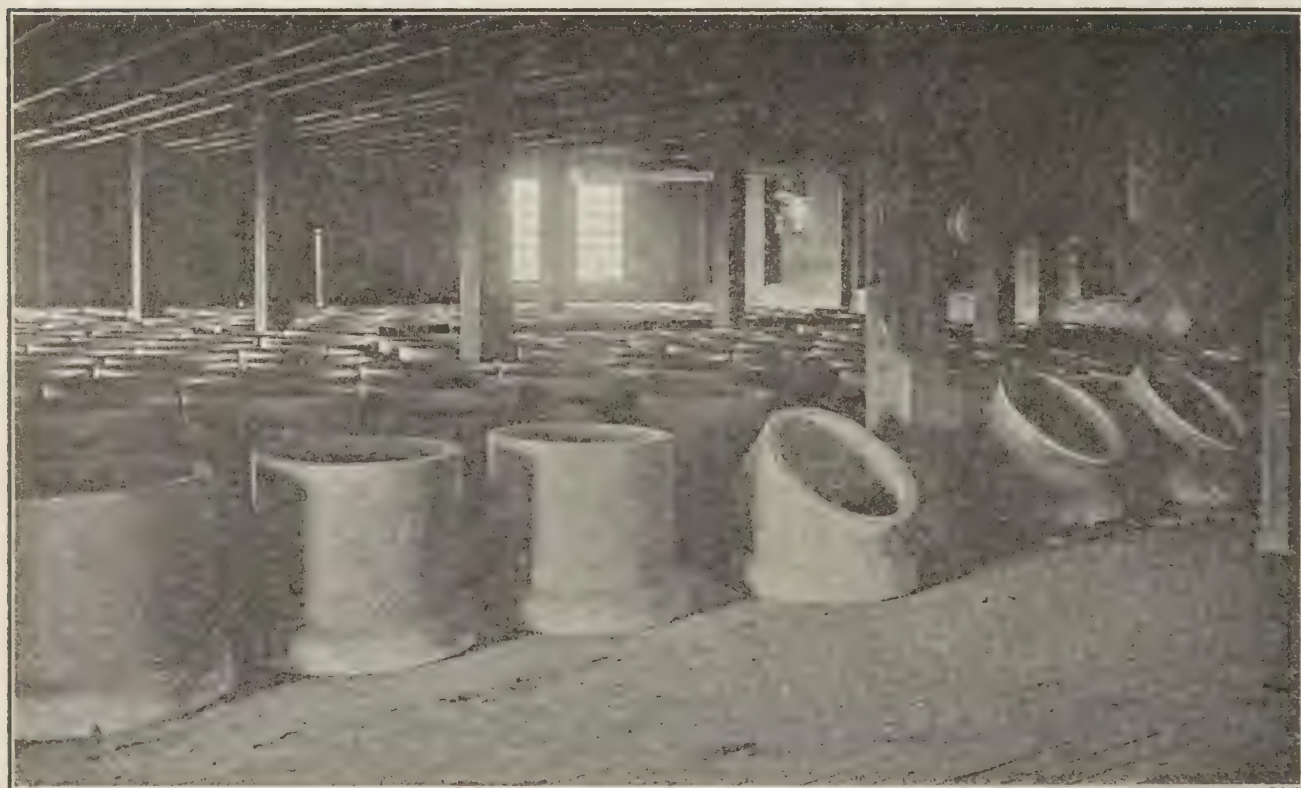
50% efficiency.

1 lbs. of coal = 6.2 lbs. of water.

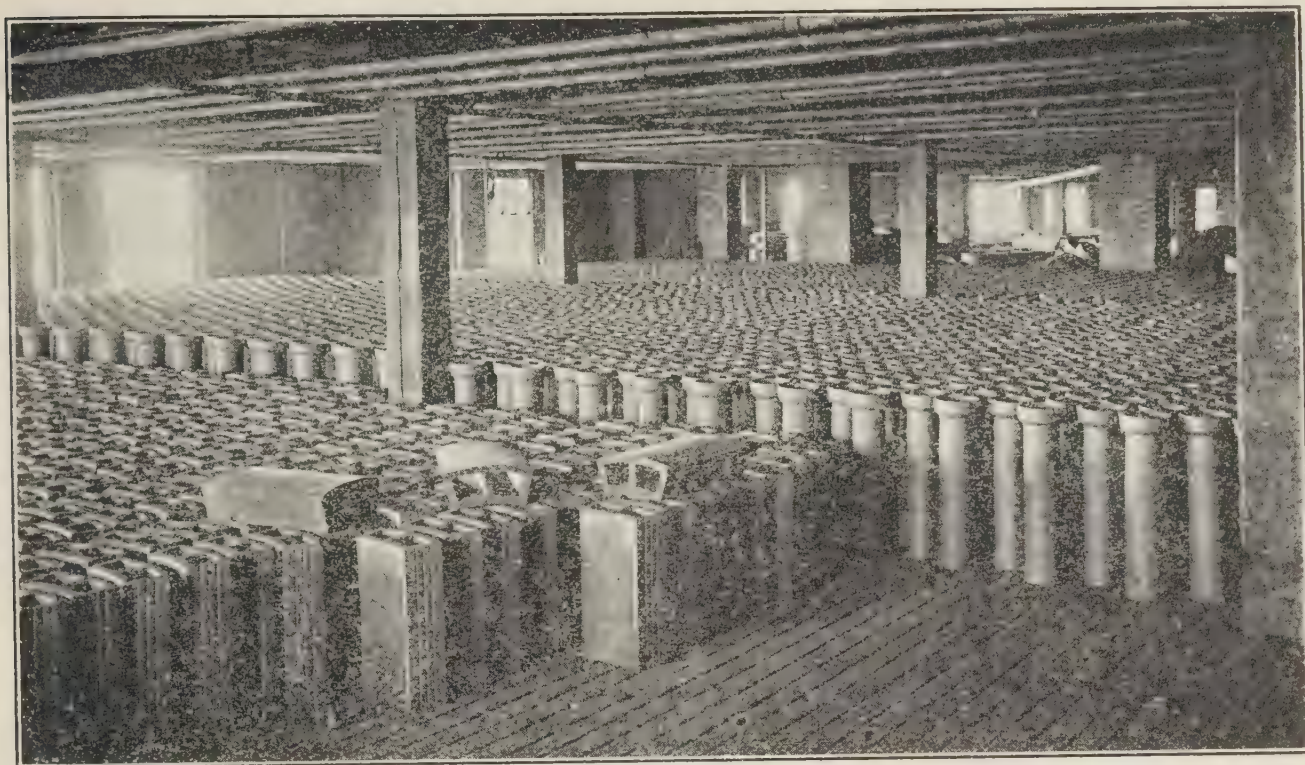
16 B.H.



Drying floor Ontario Sewer Pipe Co., Ltd.



Twenty-four-inch pipe on drying floor, Mimico, Ont.



Segment block and 4-inch pipe on drying floor, Mimico, Ont.



Brick kiln under construction, Rymal, Ont.

Total weight of water 50,600
Weight for each pound coal, 6.2. = 8,160 lbs. = approximately 2 ton, 160 lbs.
Heat required to raise temperature of ware from 50° F. to 90° F.
Specific heat of clay = approximately .2.
230 tons = 46,000 lbs. raised 40° F.
= 46,000 x 40 x .2 B.T.U. = 368,000 B.T.U.
1 lb. of coal = 13,000 B.T.U. Therefore, 28 lbs. of coal required.

Heat required to cover radiation losses.
3 days. Outside temperature 50° F.
Assume heat lost in B.T.U. per square foot of surface per hour, per degree difference of temperature = .10 (average figure).
Total surface = 2 (100 x 70) + 2 (70 x 9) + 2 (100 x 9).
= 17,060 square feet 75% only exposed to difference of temperature
= 12,795 square feet.
Loss per degree temperature difference = 1,279.5 B.T.U. Approximately 1-10 lb. of coal per hour degree difference of temperature—say difference = 90 — 50 = 40° difference for 3 days. Total coal required = 40 x 1-10 x 3 x 24 = 288 lbs.

ANSWERS.

(1)	Percentage of total.	Coal consumed.
(a) Heating in 3 days	34.70	1 ton, 380 lbs.
(b) Evaporating water	60.70	2 ton, 160 lbs.
(c) Loss by radiation	4.2	288 lbs.
(d) Heating wares .....	.4	28 lbs.
Total	100.00	3 ton, 856 lbs.

(2) Capacity of blower 10,000 cu. ft. per minute. Probable horse power, 3 h.p.

Manufacturers should keep a record of the humidity in the various parts of their factories where drying is being done, using the information to regulate the drying and to obtain improved efficiency from the floors, the photographs on plates No. 6, 7, 8 and 9 show typical arrangements. Window space should be at a minimum on account of their high radiation losses.

Table No. 11 shows the results of numerous observations and the advantage which may be had by the use of some simple instrument as the Hygrometer.

After the very careful selection of clay in the field, the most important step in pipe manufacture is the thorough and correct vitrification of the wares. This is carried out under down-draft circular arched roofed kilns. The kilns with their straight wide-walls and domed roofs are often as large as forty feet in diameter. They are built in such a way that the hot gases from the eight or more fire boxes in the walls of the kiln are thrown by the back of the fire boxes or bag-wall against

the roof. They then circulate down through the green pipes and out through the checkered fire-brick floor to the flues beneath and up through the stacks. The fire-boxes and flues are built so that all parts of the kilns receive approximately the same heat, also the wares are arranged in the kilns to obtain the same result, giving a uniformly vitrified product. When the kilns are full the door-way is built in with bricks, all chinks are carefully closed up and the kiln is ready for firing.

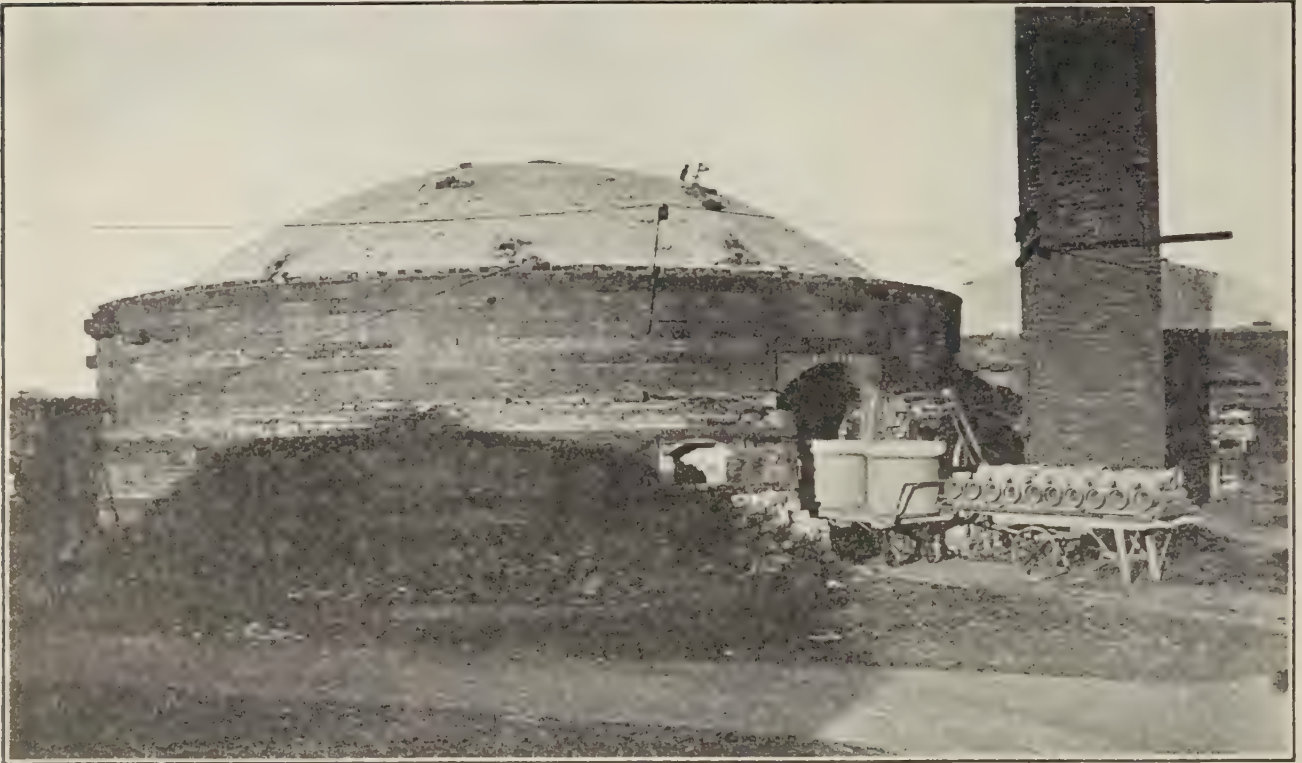
Treatment
in the Kiln

The expert burners use three methods for following the course of the burning. (1) An electric thermo-couple which is placed in the kiln, is attached to a recording pyrometer which draws a chart of the temperatures in the kiln. (2) Seger cones placed at strategic points in the kiln and extracted at regular intervals also give a record of the temperatures and show the point at which vitrification is complete and the pipes ready for salt glazing. (3) Small samples of the same clay as the

TABLE No. 11.
TABLE OF HUMIDITY READINGS ON FACTORY DRYING FLOORS

Factory.	Floor.	Room Temp. ° F.	Wet Bulb. ° F.	Difference. ° F.	Humid-ity.*	Pipe Temp.	Room Minus Pipe Temp.	Pipe Wet or not.	Time	Location.	Remarks.
Ontario.	1st	76	64	12	52	—	—	—	6.15 p.m.	Office	Floor well covered with damp pipe.
	1st	76	66	10	59	—	—	—	6.45 p.m.	Centre	
	1st	76	67	9	63	70.7	5.3	Damp	9.00 p.m.	„	
	1st	75	65	10	59	—	—	—	6.20 a.m.	„	All pipe nearly dry.
	2nd	88	71	17	43	88	0	Dry	7.00 p.m.	„	
	2nd	87	72	15	48	85.5	1.5	„	9.20 p.m.	„	
	2nd	87	71	16	45	—	—	—	6.30 a.m.	„	One half pipe dry, remainder damp.
	3rd	83	70	13	52	82.8	0.2	Near dry	7.15 p.m.	„	
	3rd	84	71	13	53	—	—	—	9.40 p.m.	West wing	
	3rd	84	69	15	47	75	9.0	Quite damp	7.30 p.m.	Centre	Mostly quite damp.
	3rd	81	68	13	51	—	—	Near dry	6.40 a.m.	„	
	4th	85	69.2	16.8	42	72.4	12.6	Quite wet	7.45 p.m.	West wing	
	4th	82	68	14.0	49	70.7	11.7	„	8.15 p.m.	Centre	
	4th	83	69	14	49	72.6	10.4	„	10.00 p.m.	„	
	4th	83	70	13	52	—	—	—	7.00 a.m.	„	
Average	Outside	82	36	3	52	—	—	—	7.15 a.m.	Average humidity in factory 52°
Dominion	1st	79	76	3	87	77	2	Damp	West wing	Drying floors not nearly full.
	1st	79	76	3	87	76.4	2.6	„	.....	Centre
	2nd	87	72	15	48	84.5	2.5	Half dry	.....	West wing
	2nd	80	70	10	61	—	—	—	.....	Centre
	3rd	77	71	6	75	72	5.0	Half dry	West	Just taken to kilns. About ready to take to kilns
	3rd	76	71	5	78	—	—	—	.....	Centre
	4th	78	73	5	79	74	4	Damp	.....	West
	4th	77	73	4	83	74	3	„	.....	„
	4th	86	71	15	48	—	—	Dry	Centre	Average humidity in factory was 69°
	5th	86	73	12	57	83.5	2.5	Near dry	.....	„
	5th	87	72	15	48	—	—	—	.....	„
	5th	82	76	6	76	77	5	Damp	.....	West
Average	Outside	81	61	7	69	—	—	—	
„	65	67	

*Humidity is reported here as per cent. of saturation at the noted temperature.



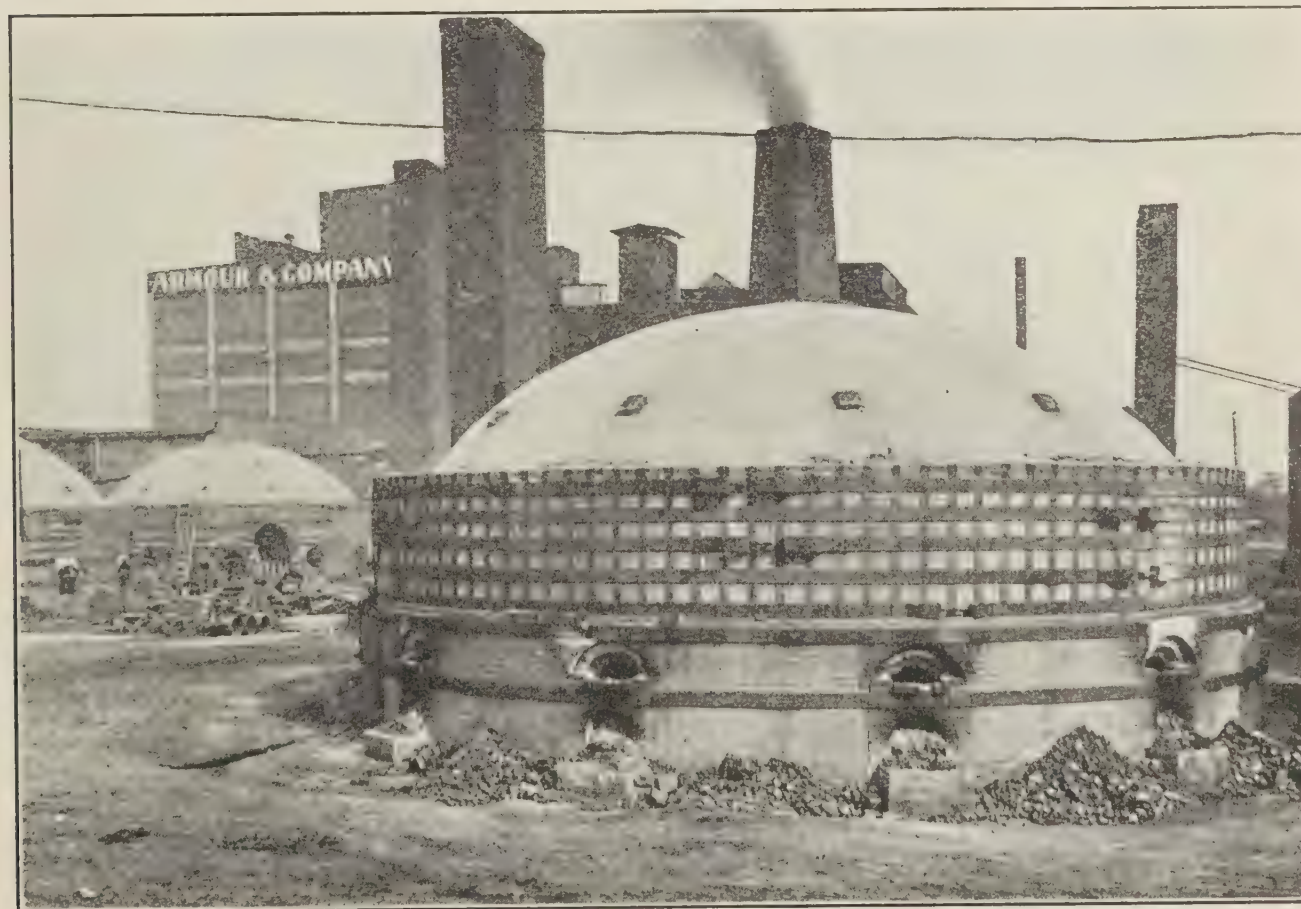
Setting green pipe in kiln, Mimico.



Interior of kiln, Mimico, showing setting.



View showing several kilns, Hamilton-Toronto Sewer Pipe Co., Ltd., Hamilton, Ont.



Sewer pipe kiln, Hamilton, Ont.

pipes are put in similar positions to the Seger cones and by extracting these samples at correct intervals the course of the burning is followed. Deep holes are left in the dome of the kiln which permit the operator to watch his wares during this operation.

There are four distinct steps in the burning of the clay products, the water smoking, burning, salt glazing and cooling.

Although the pipes that are piled in the kilns are supposed to be perfectly air dried, there is always a certain quantity of moisture and water of crystallization present and this has to be gotten rid of before applying high temperature to the wares.

In burning sewer pipe the term "water smoking" usually refers to that period during which any residual moisture from the drying floor process and water of crystallization is driven off. The fires are kept quite low till the burner knows that he has dried out his wares. During this period the interior of the kiln is very smoky and not until all the water has been driven off does the kiln clear sufficiently to see into it. The heat from the fires accumulates in the kilns and as the temperature rises after the water-smoking, and the contents of the kiln become red hot the kiln gases are so clear that one can see to the floor of the kiln and note the condition of the pipe.

Water Smoking

The water present as moisture could be driven off at about 220 degrees F. or a little over boiling point, but the water of crystallization or combined water in the clay would not be completely removed till a temperature of 1,200 or 1,300 degrees F. had been reached. If there is demand for drying floor space and the pipe are put into the kiln before they are well air-dried there is an excess of moisture to be driven off in the kiln. If the heat is raised suddenly before the completion of the water-smoking there is a danger of forming steam between the laminations in the pipe faster than it can freely escape. These pockets of steam expand with increase of temperature and with bad firing the pressure becomes sufficient to blow and cause cracks or blisters which destroy the value of the pipe. Speeding the process usually results in poor coloured, scummed and blistered pipes. The forced drying seems to leach out to the surface soluble salts that otherwise would remain in the body of the pipe.

Depending upon the size and thickness of the wares, water-smoking takes from one to two days.

The temperature is gradually rising during the process and when water-smoking is complete the operator can see the floor from the peep hole in the dome of the kiln and the fires have been built well upon the grates. Just so soon as the contents are red hot from top to bottom there is little danger in raising the temperature. It is then quickly raised.

The water of crystallization is driven off as the temperature rises. Then at a higher temperature the carbonates present in clay decompose and give off carbon dioxide. If the clay wares were cooled at this period of the burning they would be found to be quite porous and more or less like the clay in flower pots. At this stage there has been very little knitting between the grains of clay.

As the temperature rises a point is finally reached when the edges of the clay drains start to soften. This is called insipient vitrification. At a still higher temperature the clay fuses and become liquid. This would be the point of fusion. Now somewhere between the points of insipient vitrification and fusion is the correct place to stop the burning. The temperature range between these points is called the range of vitrification of the clay.

Vitrification

The term "vitrification" is quite lightly used, although most manufacturers appear to appreciate the technical limitation of the term.

With some clays this "range" or interval between the temperatures of insipient vitrification and fusion is quite wide—say 200 or 300 degrees F., while with other clays the range is very narrow, i.e., so narrow that a burner could not possibly control his fires sufficiently to thoroughly vitrify his wares. He might draw test pieces from the kiln and decide that his wares were vitrified, and before he could complete his salting the wares would have fused, softened and collapsed. The distorted mass in the kiln would be broken up with crow-bars and scrapped.

In the regular process of vitrification as the temperature of the clay rises above the point of insipient vitrification the clay grains partially soften and blend into each other till the mass is no longer made up of individual crystals lying beside each other, but is massive and homogenous in formation. The interstices between the grains become smaller as the clay nears the point of fusion.

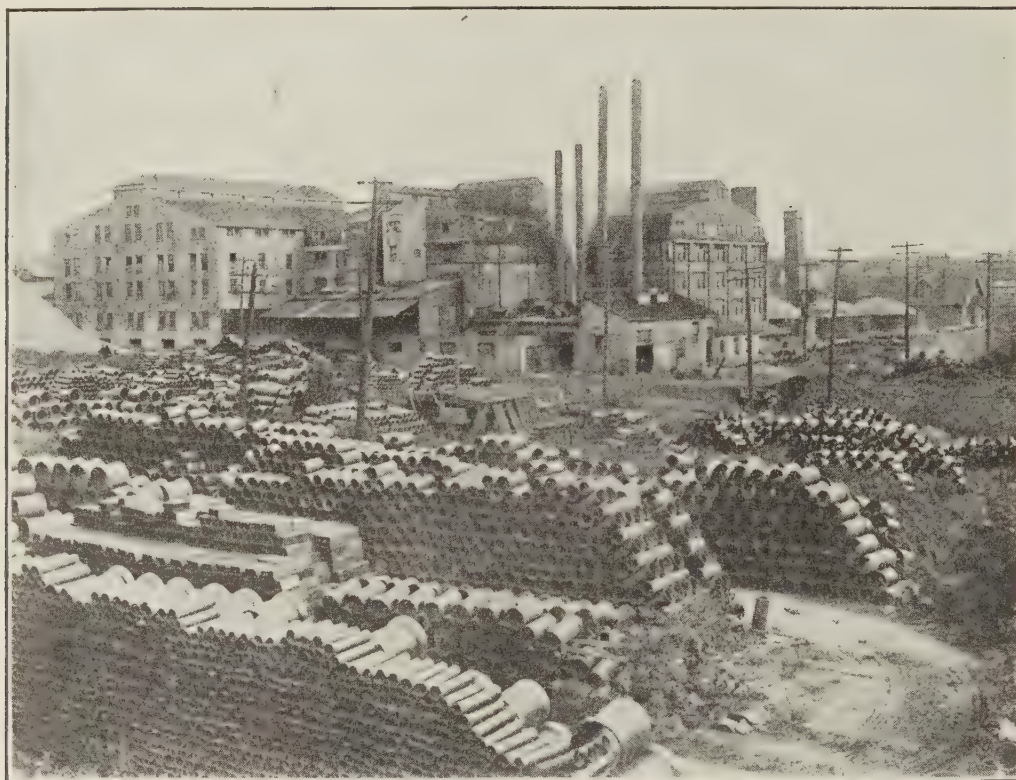
It has been variously stated and is approximately true that as the proportion of fluxes in a clay increase the melting point is lowered. It is often found, however, by actual practise and observation that two clays having about the same chemical analysis may have widely different physical properties, such as plasticity and range of vitrification. These physical properties depend on the physical as well as the chemical characteristics of the clay. Small samples collected and chemically analysed serve only as preliminary guides. Even small samples made up and burned in experimental or factory kilns may give misleading results. It is only when large samples are used and put through the regular factory process and burned as regular products that the true character of the clay for that particular ware is shown.

To determine the suitability of a clay it is important that its behaviour for each step in the process of manufacture be closely studied in the factory.

Complex silicates are formed in well vitrified clay pipe which are quite chemically inert and are not effected by the action of acids or alkalies even at boiling temperature.

Soft burned pipe will absorb as much as 14 per cent. of water while a pipe burned to the point of fusion would have no absorption. It would be as dense as glass. The absorption then is taken as a measure of the vitrification, and a pipe is said to be vitrified when the absorption does not exceed 5 per cent. The burner of Ontario clays to get very hard, non-porous well vitrified wares must burn them as close to the point of fusion as he dares. As a general statement it can be said that the Ontario pipes are not burned quite as hard as they might be. Some excuse for this lies in the fact that Ontario clays have a narrow range of vitrification and require very careful burning. It is not to be assumed from this, however, that Ontario pipe is either porous or has considerable absorption, as a matter of fact it is one of the best vitrified pipes on the continent.

The present improper burning lies largely in the fact first, that small size pipe are frequently mixed with the larger sizes having slightly different burning properties in the kilns; second, that in the trucking of green pipe into the kiln, and of burned pipe from the kiln, small fragments of broken pipe keep collecting on, and in, the checkered fire-brick floor, and interfere with the free passage of hot gases into the flues. Some parts may be clogged more than others and then parts of the kiln may burn the wares better than other parts. When there is not a free, clear draft to draw the smoke and vapour from the kiln, the kiln becomes clogged and



Portion of yard and factory, Dominion Sewer Pipe Co., Ltd., Swansea, Ont.



Shipping Tile by Auto Truck, Lake Shore Road.



Preparing to salt a kiln, Swansea, Ont.



Putting salt on fires to form the salt glaze on wares, Swansea, Ont.

slow and the bottom pipe are not burned or vitrified as well as they should be. A further consequence is that the operation takes longer and the products are not so uniform, well glazed or vitrified. Care in burning but one size or thickness at a time and in keeping the floors or flues in good repair are points to be watched in sewer pipe manufacture.

The operator knows from the temperature of his segar cones, his clay samples, and from the record of the pyrometer, when the temperature suitable for salt glazing has been reached. From the time when the burner first sees floor after water-smoking to the time when the ware is ready for salt-glazing is usually sixteen hours.

The salt glaze that is formed on the surface of sewer pipe is a complete sodium iron aluminium silicate that forms at a temperature of 1,800 degrees F. or over. The salt is thrown onto the fire boxes of the kiln and dissociates into sodium and chlorine. The chlorine goes up the flue and the sodium combines with the red hot almost liquid clay surface to form a glass-like silicate. The higher the percentage of sand in the clay the more readily and better does this glaze form.

Salt Glazing

The glazing is done in the following manner,—when the burning has advanced and test pieces drawn out through the peep holes show thorough vitrification, the operator takes a wheel-barrow of salt, Plate No. 11, and goes around the kiln putting a shovelful of salt and a bundle of wood on each fire hole. When he has gone the rounds twice he draws a sample out to note if the glaze is forming. Then he gives one or two more saltings, puts on a brisk wood fire to drive or sweep out the gases remaining in the kiln and leaves the kiln for about three hours. This permits all salt and fuel gases to be cleared from the kiln by air drawn through the flues. When three hours have elapsed the damper is closed and the kiln left for about twelve hours. During this time the fire doors may be opened to partially cool the kiln, then the fire boxes are completely blocked up and the kiln is left to cool slowly. This cooling and annealing takes about three days.

Annealing is a very important step in the process. It can be seen how brittle the vitrified wares would be without annealing by examining the condition of the small samples that are taken from the kiln to observe whether the salt glaze has struck well or not. These samples cool from white hot to air temperature in ten or fifteen

minutes and are extremely brittle. A slight tap with any hard object will shatter the sample. The sample is beautifully polished but is not tough. If the kilns were cooled as quickly as possible the pipes would be as brittle as the sample and would be covered with fine air checks or cracks. The slow cooling anneals and toughens the wares.

During the first stage or twelve hours of cooling the temperature is so high that no harm is done by leaving the fire holes open, but as soon as the kiln has partially cooled all points where air might possibly enter are blocked up and the cooling continue by radiation through the kiln walls.

Through the courtesy of Ontario's Agent-General in London, Mr. Richard Reid, the following information regarding the manufacture of sewer pipe in Scotland is available:

"The raw material used is a fire-clay. It is dried, ground and passed through screens varying from 8 to 14 mesh to the inch. The clay is tempered with water and conveyed to screw presses that operate much slower than the Canadian or American steam presses.* The Scotch firms turn out from the press 90-120 4-inch pipe per hour, 80-95 6-inch pipe per hour and 10-15 24-inch pipe per hour.

*This is about one-sixth the speed of the presses in Ontario.

"The wares are on the drying floor from two to eight days depending on size. Circular drawn-draft kilns like those in Ontario are used, and the burning operation varies in length from five to ten days.

"Some plants use an extra slip glaze for their wares and others do not. A typical slip glaze used is a mixture of ground glass, fine red surface clay or English pipe clay which is screened and applied in a liquid state by a spray or brush. All pipes are salt-glazed, but the slip-glaze ones have a thicker, more glassy glaze.

"They claim that any loss in the kiln depends entirely upon the management; it sometimes reaches 5 per cent."

The fire clay used in Scotch pipe fuses at a much higher temperature than is necessary for salt glazing. As a result the pipe come out of the kiln beautifully glazed, but not thoroughly vitrified. The surface of the pipe is glassy, but with the surface chipped off the body of the pipe is more or less porous and under-burned. The wares are very carefully made, are smooth, well formed, and in appearance very excellent pipe. The only factor not in their favour is that they are more porous than and not so hard as Canadian sewer pipe.

If the Ontario manufacturers were as careful to produce clean glazed, good coloured, well formed pipe as they are in Scotland we should have here pipe that would be absolutely second to none.

2.—GLOSSARY FOR USE OF INSPECTORS AND STUDENTS.

ABSORPTION, COLOUR OF FRACTURED SURFACE, HARDNESS AND TONE OF RING.

Place any ten sewer pipe in a row, bell ends up, and make sure that there are no flaws or cracks in any of them. By striking them with a light hammer each will give a musical note. Arrange them from left to right so that the pipe on the left has the highest note or pitch and run down the scale till the right hand pipe has the lowest ring. Then starting with the left hand pipe break it and select a sample that weighs about 300 grammes and shows a fractured edge all around. Do the same with the remainder of the pipe and arrange the small samples in a row corresponding to their original positions. The pipe of lowest ring will be a light almost yellowish red colour and the colour will deepen as one goes up the scale till that of the top pitch will be found to be a dark red. As the shades vary from light to dark it will not be found necessary to rearrange any of the samples. The colour varies directly as the pitch. Light colour, low pitch, and dark red high pitch.

On examining these samples it will be noticed that the lustre of the cross section varies. The light red sample will be lustreless and earthy in appearance and each sample will have more lustre as the colour darkens till the last dark coloured one will have almost a metallic lustre. The lustreless sample is soft and that of metallic lustre cannot be marked by hard steel.

Take these same samples, dry them thoroughly at a temperature above boiling water and weigh them, noting the weights. Immerse them in water for eighteen hours and after blotting all surface water weigh them again. The change in weight from the dry to the wet samples will be the moisture absorbed. It will be found that the absorption is highest in the low toned, light red, lustreless sample and lowest in the high keyed, dark red, hard sample. And the absorption of the others will be evenly ranged between these two.

In testing the pipe for internal pressure it is found that the strength varies as the absorption, ring and hardness. Great strength with dark colour, high pitch and low absorption.

THE CLAIM THAT THE SEWER PIPE MANUFACTURED IN ONTARIO IS OF SUPERIOR QUALITY IS BASED ON THE FACT THAT THEY ARE MORE THOROUGHLY VITRIFIED THAN PIPES IMPORTED FROM OUTSIDE. The more thoroughly the wares are vitrified the closer they approach to the glass-like composition. The pitch is clear and high, the colour of the pipe under the glaze is dark red, the fractured surface has a metallic lustre and the absorption is a minimum.

APPEARANCE always counts for much. It is only natural that one should prefer a dark coloured, well formed, highly glazed sewer pipe, to a lighter coloured, scummed, dull, rough looking pipe and yet it is very possible that the latter pipe may be far superior in the qualities which mean good service.

The fine appearing pipe may be good or may not. This depends on how well vitrified it is. If the clay were high in silica or sand and one that would stand a temperature of say 1,950 degrees F. the burner might start his salting when the temperature was 1,875 degrees F.

At this temperature with the sandy clay a good salt glaze would form, i.e., the wares would take on a good salt glaze at a temperature below that of thorough vitrification. If one were to break a sample of such a pipe and were to put his wet tongue against the fractured surface he would notice that the moisture was quickly absorbed. It is quite possible to have a well glazed sewer pipe that will have an absorption of 10 per cent. or more of water. It does not need any discussion to convince a person that a soft burned high absorption pipe will not resist erosion and wear so well as a hard burned pipe. The chemical change into the complex silicates has not reached completion and the pipe material will not be so chemically inert or acid resisting. The pipe may also slowly disintegrate by the freezing of absorbed water. *A hard burned pipe is close grained, hard, low absorption and chemically inert.*

One frequently encounters pipes that from the point of view of appearance are decidedly seconds or even culls, but which on closer examination have all the qualities which go with long wear and good service. Pipe is good pipe when it is uniform and symmetrical in shape and is hard burned. The greyish pipe may have entered the kiln before being completely dry or may have been subjected to the sulphur fumes of a bad shipment of coal, but if the burner has held his kiln at vitrification temperature till his wares were thoroughly vitrified he has produced a pipe that falls short in appearance only. It is, however, true that carelessness at some stage of the process has produced this dull rough looking pipe, and that with more attention the pipe should have had all the qualities which make it readily marketable and acceptable.

BLACK CORES.

Occasionally when a sewer pipe is broken, the fractured surface will show a dark or black core between the red outer layers of the pipe. Sometimes this core will be only about one-tenth the thickness of the pipe and at other times over half the thickness. The core is the result of poor burning, and is caused by incorrect supply of oxygen in the kiln during the burning. When the flues are not drawing well there is a large supply of carbon from the coal and not enough oxygen or air to give complete combustion and an oxidizing atmosphere. The iron salts in the clay are not formed into the red ferric oxide but are reduced to the black ferrous oxide

of iron which colours the centre of the pipe wall. At a later period of the burning when the kiln is being finished the outer layer of the pipe is oxidized to the red colour, but the centre remains black. These black cored pipe are not as high grade as the clear dark red ones.

SMALL CAVITIES OR PERFORATIONS IN THE PIPE.

In some parts of the clay areas the ground is covered with forest growth. This forest is cleared off and the large roots cleaned out, but the smaller roots penetrate quite a distance into the ground and remain there. A very light surface is scraped off and discarded and then the remainder down to where the shale and high lime start to show, is collected and sent to the factory. If the screens are out of repair some of these small roots will get into the tempering pan and will appear on the green pipes. The roots ultimately burn out and leave cavities or perforations. Of course the remedy would be more careful collection in the field and new or repaired screens.

COLOUR OF FRACTURED SURFACE. See absorption.

CRACKING.

This has been mentioned in connection with the drying of the green pipe.

Cracking depends almost entirely on the composition of the clay used. If the clay is either too lean or too fat the wares will crack.

Lean clay is that which lacks plasticity and contains too much sand or loam. To remedy cracking in a lean clay one adds some fat clay.

Fat clay is almost free from sand or loam, is wax-like when slightly moist, and breaks up into cube-like particles when freshly dug from the ground. A too rich or fat clay is not suitable for sewer pipe because of its abnormal shrinkage. This may cause cracking when the different parts of the pipe dry unevenly. Cracking is overcome here by mixing some lean clay with the fat clay.

In practice it most often happens that right at the surface of the ground the clay is just a little loamy, and a little further down it is a little too fat. In stripping the clay these are both taken and thoroughly mixed before arriving at the press.

For preventing cracks in the wares on the drying floors it is suggested that:

*"By adding one or two per cent. of common salt (NaCl) to the clay in the tempering pan one can retard the too rapid drying of the surface of the wares. As the drying proceeds the salt solution exudes to the surface and deposits there a small quantity of salt. The salt is hygroscopic and does not completely dry. It keeps the outside of the wares moist till the inside has dried out. The slightly moist surface prevents cracking, as the salt is subsequently burned off in the kiln."

DISCOLOURATION AND SCUMMING OF THE SURFACE OF THE SEWER PIPE.

There are three fundamental causes for scumming and discolouration. One is moisture, the second is lime and the third is sulphur. The first two may be considered together.

As a rule pipe which has not been sufficiently dried in the factory introduces an excess of moisture into the kiln. If this happens with a clay which contains a large percentage of soluble lime salts under the forced drying conditions in the

*Mr. Joseph Keele, B.A.Sc., Dominion Government Ceramic Engineer.

kiln the lime salts come to the surface and leave a deposit which is, or is converted into, calcium sulphate. These salts generally remain in the body of the pipe when the pipe is air dried or dried slowly.

The explanation given is that the soluble salts in the clay, usually calcium sulphate (Ca SO_4), are brought out to the surface in the forced drying of the oven or drying-room floor. The workmen say that the factory-dried wares dry from the inside out and the air-dried from the outside in. It is certainly true that scumming is most often caused by soluble salts in the clay and under forced drying conditions.

In some clay ware industries they add certain chemicals to a high lime clay to prevent efflorescence or scumming. Barium carbonate in the form of a powder is mixed in with the clay. The barium carbonate is not soluble in water and so to secure a very thorough and intimate contact between all the clay and all the powder, very careful mixing is necessary. The soluble salt in the clay is changed to an insoluble one which is not leached out to the surface.

Barium chloride is also sometimes added for the same purpose.

The cost of chemical treatment of the clay in sewer pipe industry is almost prohibitive. For example, if the clay contains water solubles, say one per cent., then in one hundred pounds of clay we will have one pound of scumming material, calcium sulphate (Ca SO_4). The Ca SO_4 and Ba CO_3 react chemically in the proportion of 136 to 197 or for every 136 parts of Ca SO_4 we need 197 parts of Ba CO_3 . The one hundred pounds of clay mentioned above would need 1.4 pounds of Ba CO_3 . An absolutely ideal mix and other favourable conditions might give this, but normal conditions would hardly give a fifty per cent. efficiency. This would mean the addition of at least three pounds of Ba CO_3 for every one hundred pounds of clay. The retail selling price of one hundred pounds of sewer pipe is approximately \$1.00. This gives the cost of chemical as 7 to 9 per cent. of the selling price.

If a manufacturer decides to use barium carbonate (BaCO_3) to prevent scumming he should have his clay analyzed and discover just how much he will have to add to overcome the difficulty.

If the clay is high in lime but is well dried, and if the kiln is free from excess water and steam, it is still difficult to secure a good salt glaze. Sulphuric acid, formed from the small quantities of moisture and sulphur usually present in the fuel used for firing, turns the lime into the soluble sulphate which exudes to the surface of the pipe where it forms a thin coating and instead of the clear glass of sodium iron silicate forming, which is glossy and transparent, a calcium silicate forms which is yellowish and opaque. If it is necessary to use only about one part per hundred of these chemicals, with barium carbonate selling at $2\frac{1}{2}$ or 3 cents per pound, the additional cost of raw material might not be prohibitive.

GLAZE.

Most users and inspectors of sewer pipe seem to consider a clear dark salt glaze one of the essential characteristics to look for in selecting pipe. Emphasis is placed on the fact that the glassy salt glaze has a much lower co-efficient of friction than other surfaces used for sewer construction. It is true that well glazed pipe has a lower co-efficient friction than bricks or concrete, but it seems to be equally true that the sewage does not really come in contact with the sewer wall after a few months operation. Men who have been working at sewer construction and maintenance for many years admit that every sewer, large or small that has not an abnormally steep slope, is coated with a fine slime.

Only hard objects like pebbles, etc., penetrate this slime and come into actual contact with the sewer wall. No matter what the sewer surface, if it be covered with this lime it will have approximately the co-efficient of friction. Inequalities in the running surface like uneven joints, appear to be more important than the character of the surface of the material of construction.

If the above be the case, and each one can decide for himself, the procuring of a brilliant glaze does not seem to be as important as making a well vitrified pipe with a hard, clear ringing body. If the glaze wears off, as it may do, the hard-burned pipe which is nearly as hard and smooth as the glaze itself will wear indefinitely. A clear salt glaze is not so important as thorough vitrification.

Sulphur in the coal is greatly responsible for an inferior salt glaze and even if all other conditions are favourable, may be the cause of cutting down the glaze before the kiln has been "swept out" after salt glazing. This is especially so when the foundations or flues of the kiln, due to poor underdrainage, contains water. The presence of the water interferes in two ways, first, by checking the draft and keeping the bottom of the kiln cooler than it should be, and second, in causing an excess of water vapour in the kiln. The latter promotes the formation of sulphuric acid resulting in a damaging of the salt glaze.

If there is much sulphur and much lime and moisture present the pipes may be completely covered with a white scum. Unfortunately the sulphur formed is not burned off by the high temperature of the kiln, although it may be improved somewhat by prolonged burning.

It would pay the Ontario manufacturers of sewer pipe to buy their coal on analysis and provide for storage of sufficient coal to protect against coal shortage due to rejection.

It would also pay them to make sure that their kilns are well underdrained and make impossible the presence of water in their flues.

Summarizing—the Ontario manufacturer should be careful to select clay that contains less than 3 per cent. of lime in it, thoroughly dry it and use low sulphur coal in well drained kilns. Sewer pipe made from Ontario clays, low in lime, well dried and burned in the absence of sulphur will always take on a clear salt glaze.

HARDNESS. See absorption.

LIME SPOTS.

Sometimes soft white spots which vary in size from a pin head to a pea occur in sewer pipes. This is caused by small particles of limestone which accidentally has been mixed in the clay. It may come from the clay field in the form of pebbles or may be from an uncleaned gravel car used for clay on the railway. The soft white spot is quick lime.

These spots either wash out leaving a pit or take up water to form a calcium hydroxide which swells and causes scaling or a fracture of the pipe. Pipe containing numerous lime spots should be rejected.

The factory must exercise care in the selection of the clay and should make certain that the conveyances used from field to factory are clean. If the clay were finely ground and thoroughly mixed a small quantity of extra lime, not exceeding a total of 3 per cent., well distributed in the clay would have no effect on the quality of the finished pipe.

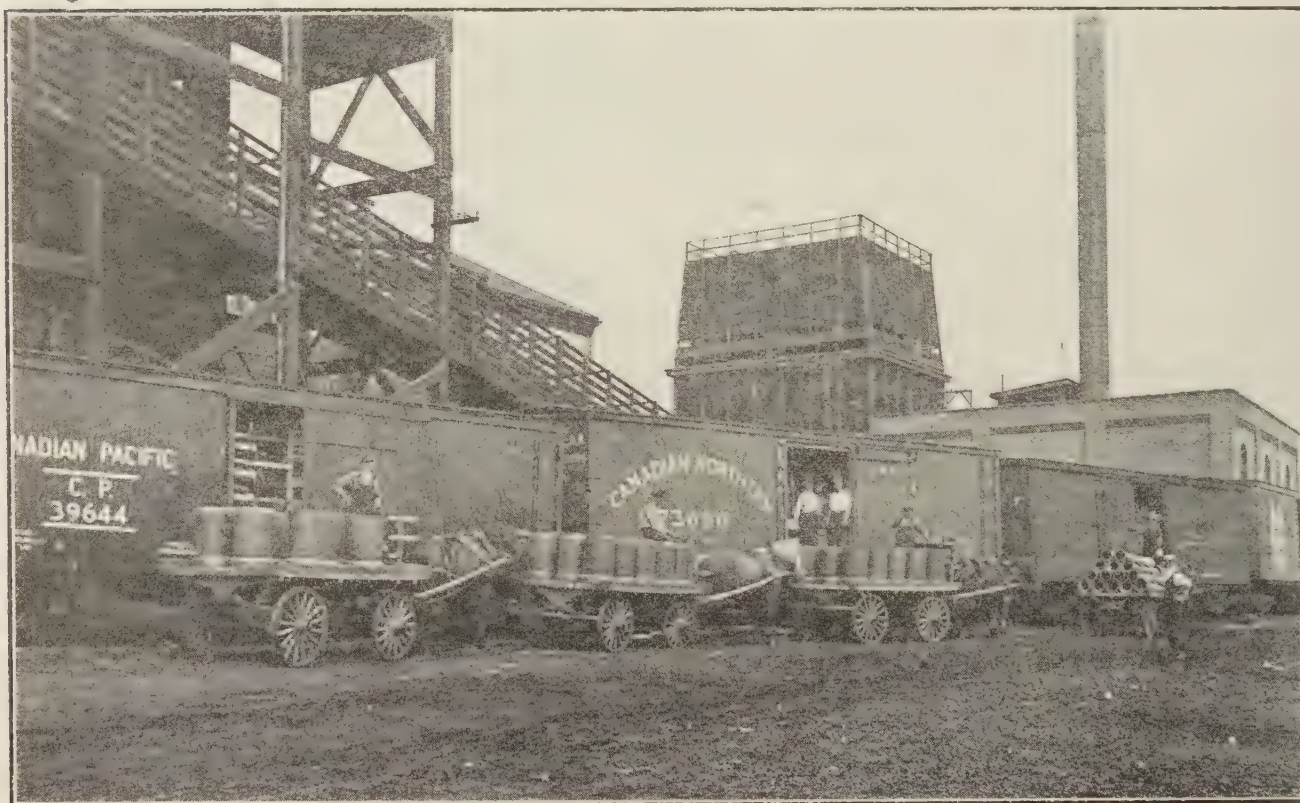
Mr. Keele suggests the addition of one per cent. of sodium chloride on bone dry weight of clay to overcome lime spots. It works. He also suggests a method using a reducing atmosphere in the kiln.

By maintaining a reducing atmosphere in the kiln during the early stage of the burning (which means an absence of excess of air and oxygen) the calcium carbonate is burned to lime, then the sulphur in the coal and moisture in the kiln forming sulphuric acid, attack the lime and change it into calcium sulphate. The small lime spot which is carbonate burned to the form of calcium oxide would then be calcium sulphate which does not change when exposed to air and moisture:

The method would be to cause a reducing atmosphere in the kiln a little before, at the time when, and after it reaches the temperature of the dissociation of calcium carbonate.

SCUMMING OF SURFACE. See discolouration.

RING. See absorption.



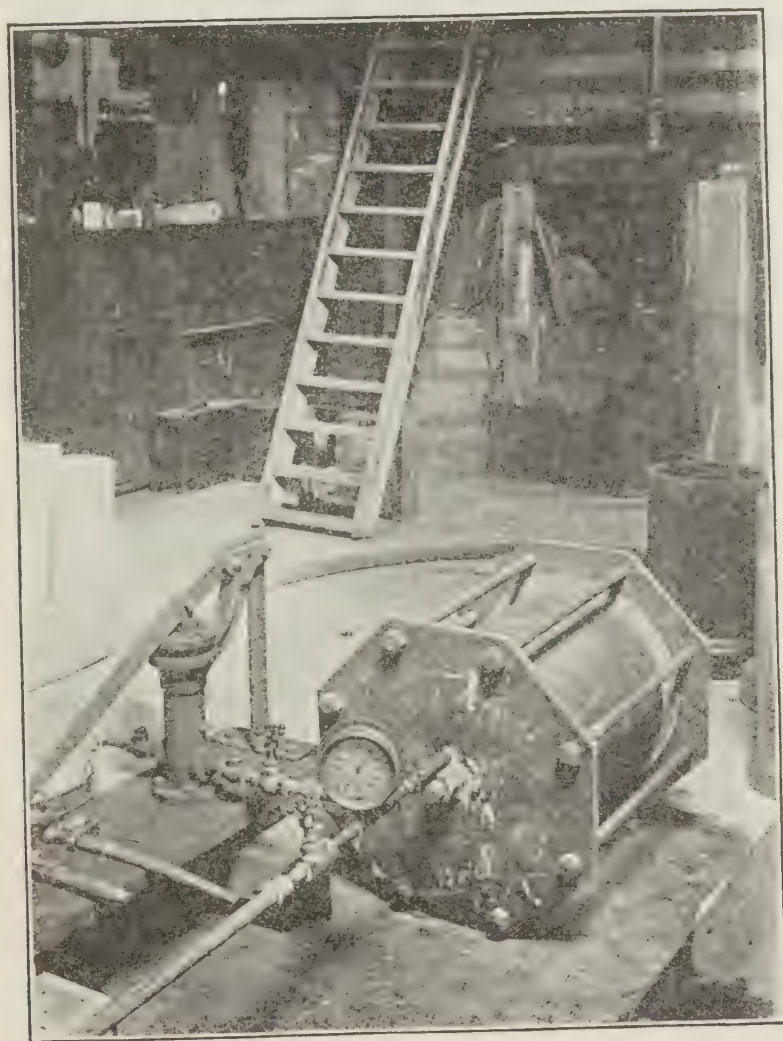
Shipping pipe, Hamilton, Ont.

3.—TESTS MADE OF VITRIFIED CLAY SALT GLAZED SEWER PIPE MANUFACTURED IN ONTARIO.

RESISTANCE TO INTERNAL PRESSURE.

The physical factors which would tend to destroy a sewer pipe which had already been laid in the ground and covered over, are erosion, external pressure and internal pressure. These factors will be studied separately.

Sewer pipe are seldom subjected to very great internal pressure. All sewers should be equipped with manholes which permit of sewer inspection and act as safety valves or vents in times of flood. During storms and floods a sewer may receive more water than it can carry away and it occasionally happens that where the grade is flat or where any obstructions exist the water rises in the manholes until it either overflows or creates sufficient pressure to force the obstruction through the sewer.



Testing vitrified clay sewer pipe by internal pressure,
Experimental Station, Provincial Board of
Health, Toronto.

The pressure in the sewer therefore will seldom exceed the equivalent of the head produced by the depth of the nearest manhole. Even in exceptional cases this head would rarely exceed 30 feet and should not produce a pressure greater than 15 or 20 lbs. per square inch in the sewer. So if the sewer pipe will stand an internal pressure of 20 lbs. per square inch without bursting it is quite strong enough for any condition that would exist in practise. If the sewer leaks at the joints it is not a fault in the pipe but in the sewer construction.

No previous tests were available on Canadian sewer pipe and their approximate strength was not known. The testing apparatus was designed to break pipe that might test as high as 200 lbs. per square inch. The apparatus was roughly, two steel bulkheads held against the ends of the pipe by means of long bolts as is shown in the illustrations. Rubber sheets $\frac{1}{4}$ inch thick were used as gaskets between the steel plates and the pipe. One of the bulkheads was fitted with a petcock, elbow and nipple, so that when the pipe was on its side the air would be permitted to escape as the water filled the pipe. The other bulkhead was fitted with a three-quarter inch iron pipe through which the water entered.



First longitudinal crack—resistance to internal pressure.

The water piping was arranged so that the sewer pipe could be filled from the city water system and broken by the pressure from a hand-pump.

In making the test one bulkhead with the eight 1-inch bolts in place was laid on the floor, the rubber gasket placed on it, and the sewer pipe stood on the rubber sheet, bell end down. The $1\frac{1}{2}$ -inch centre bolt was then put in place, the other rubber gasket placed on the spigot end of the pipe and the heavy steel bulkhead placed over it. The side bolts were slightly tightened, the pipe carefully centred and the bolts made more tight. The whole outfit was then tilted over till the sewer pipe was horizontal with the floor, care being taken that the nipple for the air exit was perpendicular. All the bolts were tightened and the water inlet coupled on. The pet-cock air vent was opened and the city water turned on and left running until at the moment when water started to run out of the air vent.

With the city water shut off and the pet-cock closed the valve of the pressure pump was opened and the pump operated. The pipe being already full of water it required very little effort and pumping to cause the pressure to rise to a point where the pipe would burst or pop. In every case the pipe broke in long cracks longitudinally and did not fly to pieces. The maximum reached by the gauge was noted and the apparatus uncoupled.

Each pipe before being tested was carefully inspected and measured and its condition noted.



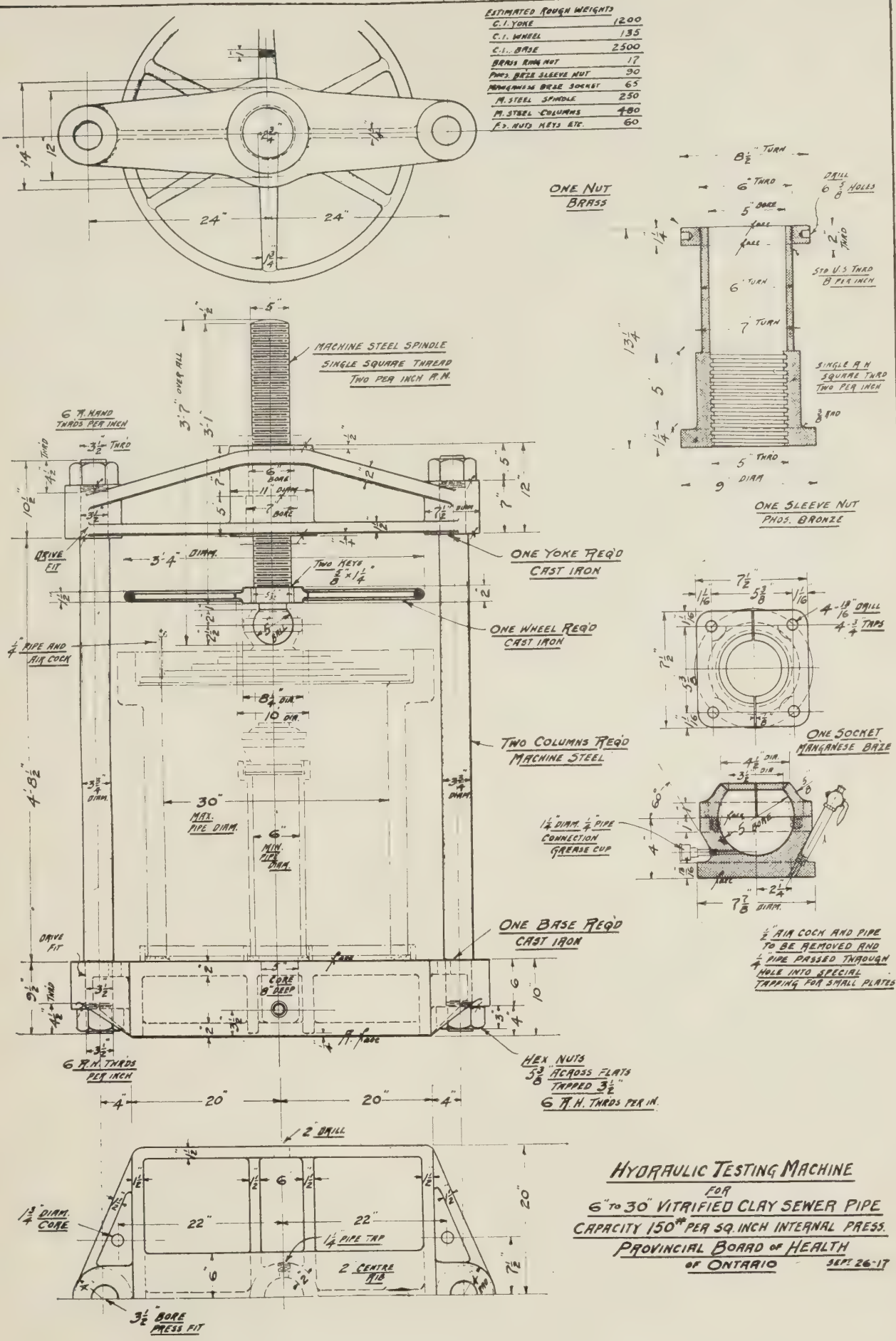
Pipe broken by internal pressure.

If the ends of the pipe were quite regular and even, it was not difficult to keep the rubber gaskets tight enough to prevent leaking, but if the bell end particularly, happened to be a little uneven it leaked. See photo No. 48. The pressure might run up to 80 lbs. per square inch without bursting the sample, but leakage makes it impossible to obtain any higher pressure. The bolts would be tightened and the pressure again put on, when the pipe might burst at 60 lbs. pressure. The heavy bolts and nuts would put so much strain on the bell of the pipe that it was weakened and failed at a pressure which did not show the real strength of the pipe. It is very reasonable to infer that all of the results tabulated show bursting pressures considerably lower than the true strength of the pipe.

This method of testing (which is acknowledged faulty) gives to the weakest pipe tested a strength sufficient to withstand a pressure equivalent to a head of 40 feet of water. The pipes therefore are evidently strong enough for all practical purposes, and are certainly stronger than our figures show them to be. In the

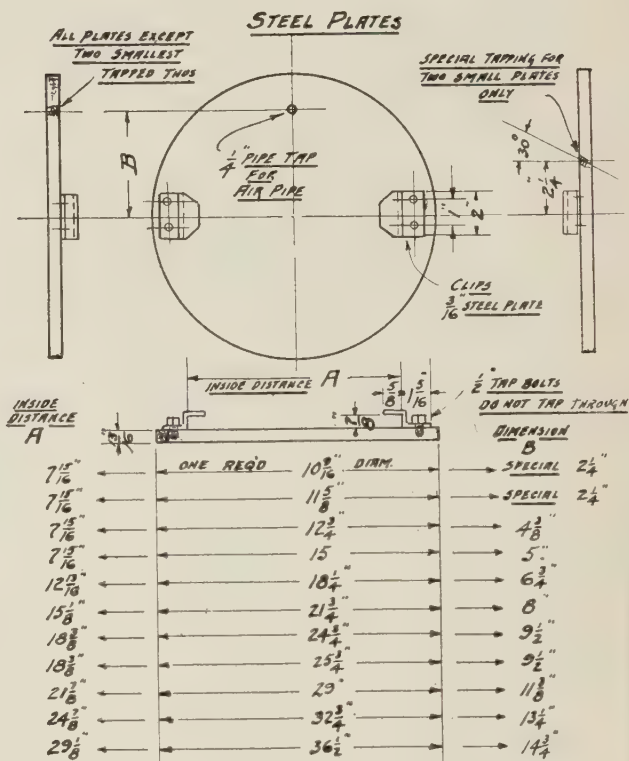
TABLE No. 11.
INTERNAL BURSTING PRESSURE ON VITRIFIED CLAY PIPE.

No.	Size. inches	Manu- facturer.	Glaze.	Color.	Ring.	Hard or soft burned.	Bursting Pressure.	Absorp- tion.	Remarks.
1	4	Hamilton	good	dark brown	clear	medium	.....	4.5	End uneven and so pressure of end bolts broke it before water was introduced.
2	6	"	"	"	"	hard	60 to 65 lbs	4.0	Good looking pipe, lacked lustre.
3	6	Ontario	poor	very light brown	very clear	"	120+	1.0	Pipe might be called a 2nd from appearance. Not smooth or well finished.
4	6	Dominion	fair	dark brown	clear	under med.	40	5.4	Several root holes. Two right through the pipe. Otherwise fair looking.
5	8	"	good	"	very clear	hard	55	1.2	Good looking, but a few cracks on the surface that do not go through.
6	8	Hamilton	"	"	clear	medium	60	5.3	Good looking, lacked lustre.
7	8	"	"	brown	"	under med.	50	5.3	Clean and well shaped.
8	8	Ontario	poor dull	light brown	"	hard	40 to 50	4.0	No polish to pipe.
9	9	"	poor	very " "	very clear	"	120	1.6	Judged by color was a 2nd. Very sound.
10	10	Dominion	"	dark brown	clear	over med.	45	3.1	Weakened by fire cracks in bell. A few root holes.
11	10	Hamilton	excellent	very dark brown	"	medium	70	4.3	Very fine appearing. Well finished and glossy.
12	10	"	good	brown	"	"	45	4.6	Good appearance. Well shaped.
13	10	Ontario	none	very light brown	"	soft	.....	6.5	End pressure of bolts broke, underburned and weak bell.
14	10	"	good	dark brown	"	hard	60	1.2	Good looking pipe.
15	12	Hamilton	"	brown	"	over med.	60	4.4	Good looking pipe.
16	12	Ontario	only fair	very light brown	"	medium	37	4.4	No polish. Fire crack in bell.
17	12	Dominion	fair	dark brown	"	"	60	6.2	Dull glaze. Root cracks and holes are right through.
18	15	"	good	"	very clear	hard	65	4.5	Very rough surface. No holes. Strong looking and sound.
19	15	Ontario	none	grey	"	"	80+	3.0	Decidedly a 2nd from appearance.
20	15	"	fair	light brown	"	"	50	3.0	Rough surface, but sound.
21	15	Hamilton	good	brown	clear	"	70 to 80	3.0	Good appearance. Well shaped.
22	18	"	very good	dark brown	"	"	40	2.0	Real good looking pipe.
23	18	"	good	brown	fairly clear	over med.	25	5.0	Fire crack in bell weakened pipe.
24	18	Ontario	fair	"	clear	hard	55	2.2	Rough surface, not good color but sound.
25	18	"	poor dull	light brown	"	over med.	20 to 30	4.7	Well shaped, but poor color and glaze.



PURE RUBBER RINGS			WIDTH X
	DIAM.		
TWO REQ'D	7 $\frac{3}{4}$ "		$\frac{7}{8}$ "
"	10"		1"
"	11 $\frac{1}{4}$ "		1 $\frac{1}{8}$ "
"	12 $\frac{1}{4}$ "		1 $\frac{1}{8}$ "
"	14 $\frac{1}{2}$ "		1 $\frac{1}{4}$ "
"	18"		1 $\frac{1}{2}$ "
"	21 $\frac{1}{2}$ "		1 $\frac{3}{4}$ "
"	24"		2"
"	25"		2"
"	28 $\frac{1}{2}$ "		2 $\frac{1}{4}$ "
"	32"		2 $\frac{1}{2}$ "
"	35 $\frac{1}{2}$ "		2 $\frac{3}{4}$ "

RUBBER GASKETS
TWO OFF EACH



W.I. RING		
	DIAM.	
ONE REQ'D	7 $\frac{3}{4}$ "	
"	10"	
"	11 $\frac{1}{4}$ "	
"	12 $\frac{1}{4}$ "	
"	14 $\frac{1}{2}$ "	
"	18"	
"	21 $\frac{1}{2}$ "	
"	24"	
"	25"	
"	28 $\frac{1}{2}$ "	
"	32"	
"	35 $\frac{1}{2}$ "	

RETAINER RINGS
ONE OFF EACH

HYDRAULIC TESTING MACHINE DETAILS

FOR

6" TO 30" VITRIFIED CLAY SEWER PIPE

CAPACITY 150# PER SQ. IN. INTERNAL PRESS.

PROVINCIAL BOARD OF HEALTH

OF ONTARIO

SEPT 27-17

opinion of the operator, any pipe tested which burst at a pressure lower than 40 lbs. per square inch was either defective or seriously weakened by the end pressure of the bolts which were observed in some instances to open up fire cracks in the bell.

By referring to the table one can note that:—

- (1) The glaze and colour have little to do with the strength of the pipe.
- (2) The hard burned pipe are stronger than the soft burned.
- (3) The absorption is lower in the hard burned pipe.
- (4) Great strength and low absorption go together.

One observes here as well as in the external pressure tests, that thorough vitrification or low absorption and careful annealing are the factors which will insure long life for the product.

After completing the tests just described we are in a position to suggest some improvements on our method of testing.

When the sewer pipe is in the ground the edge of the bell of the pipe does not butt against any surface, and so it is not necessary to have its edges so even that when stood on end on a flat surface one gets contact at every point. Very few samples have perfectly even edges to the bell and sometimes the waving depressions in the edge may be deeper than the thickness of the rubber gasket used in testing. Any degree of tightness of the bolts will not press the gasket tight enough to make a leak-proof joint. It was in trying to keep the joints tight that we squeezed the samples and weakened them.

Now the spiggot end of a pipe is (required by specification) even and in a flat plane at right angles to its axis, as is also the inner seat of the bell, i.e., the spiggot end of one pipe with the bell end of another butted together would give perfect contact at all points.

An improved testing machine was designed, and is shown on plate No. 15 and 16. The use of such a machine, by testing laboratories, is recommended.

RESISTANCE TO EXTERNAL PRESSURE.

Considerable literature *re* the strength of sewer pipe in the United States of America has been published, but, as Ontario clays and the final products differ from those in the United States, the above mentioned figure could not well be used for Ontario pipe.

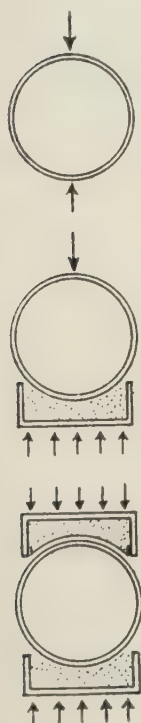
Several different crushing tests have been used at various times to determine the relative resistance to forces which tend to crush a pipe when laid on its side in a trench. These may be divided as follows:—

(a) Tests made by laying the pipe on its side and applying a load top and bottom, the crushing load being applied along a comparatively narrow line. This is spoken of in the literature on the subject as knife-edge or two-point bearing crushing tests.

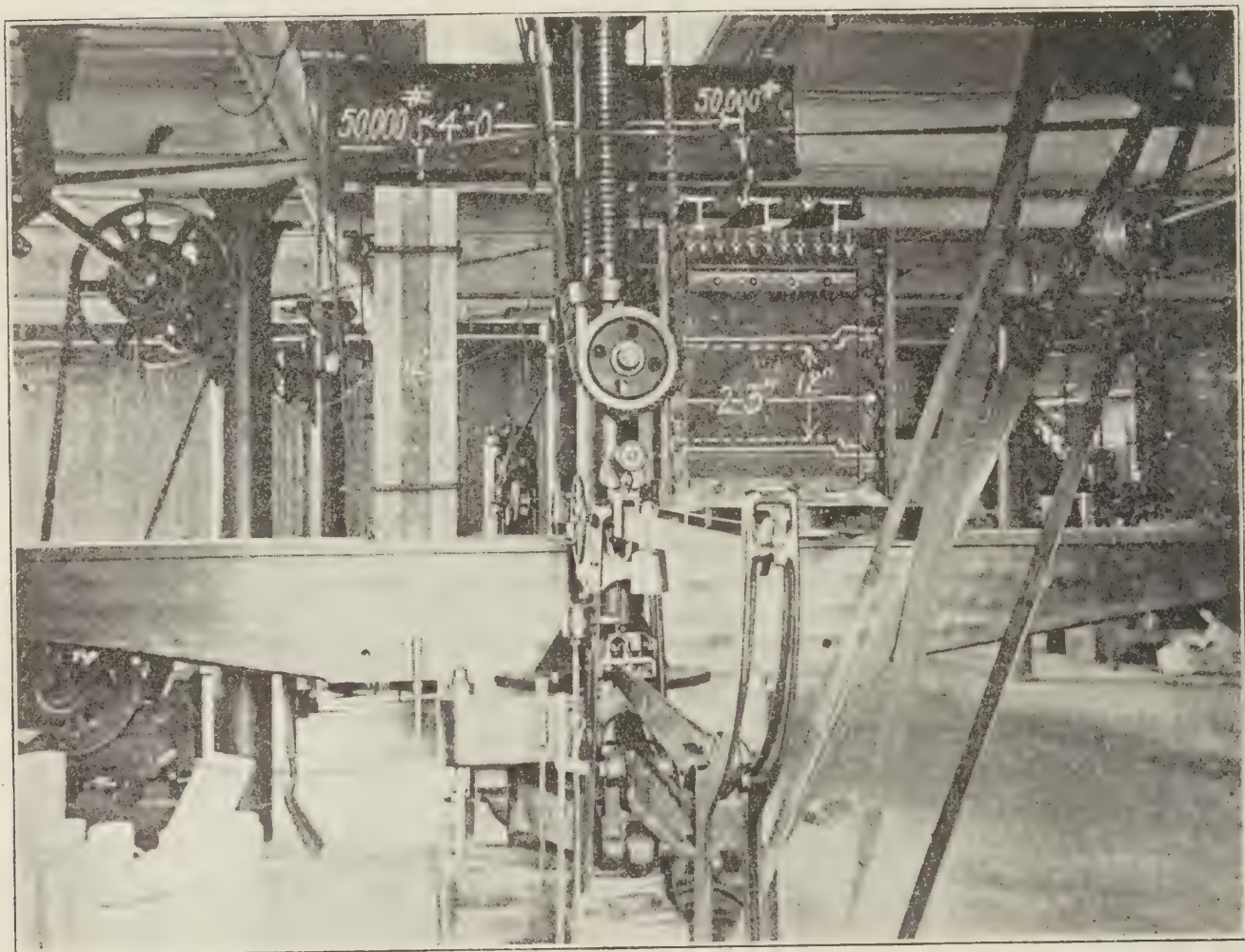
(b) Tests made by laying the pipe on its side on a sand bearing and applying a crushing load at the top, either knife-edge that is 1-inch steel bar or any surface up to $2\frac{1}{2}$ inches.

(c) Tests made by laying the pipe on its side on a sand bearing, the crushing load being applied to the pipe through a saddle constructed to conform to the upper $\frac{1}{3}$ segment.

All of these methods produce figures that permit of comparison of the same or different makes of pipe but unfortunately they do not appear to closely resemble the manner in which a crushing load is applied in actual service in the ground.



A sewer pipe laid in a trench receives more load at the top and bottom than it does at the side and yet there is no part of its circumference that does not receive some load. In an effort to have the load applied as in practice we designed, and had built what was practically a steel trench the length of one pipe and the width of an ordinary trench. The pipe to be tested was completely imbedded in sand, the load applied to the surface of the sand and distributed to the surface of the pipe. The ends of the pipe were close to the end plates of the box and the sand was prevented from flowing into the pipe by the use of thick felt gaskets. The pressure on the sand surface was applied by means of a reinforced 1-inch steel plate or ram sufficiently strong and stiff to exert a load of 150 lbs. per



Apparatus arranged for testing resistance of sewer pipe to external pressure. Pipe is laid in sand in the steel box with a cushion of sand on top to transfer the pressure.
University of Toronto Testing Laboratories—Strength of materials.

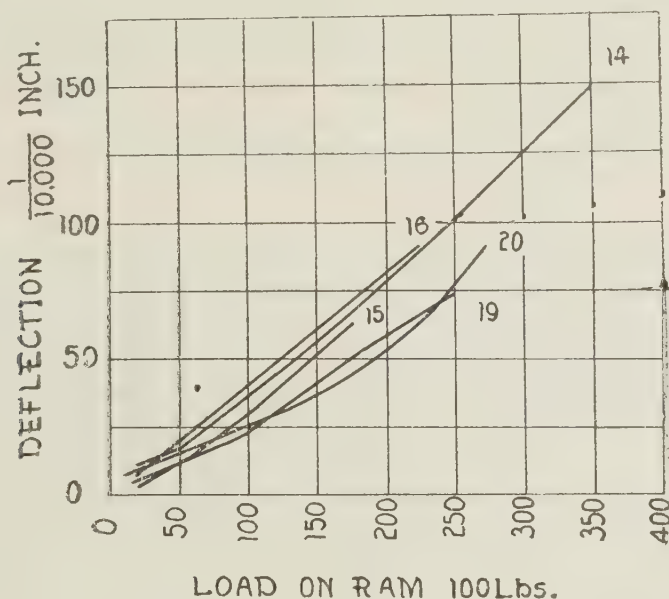
square inch. The capacity of the compression machine was 100 tons. The space between the box walls and the ram was one-half inch and the apparatus was of such a size that all pipe up to and including 15-inch diameter could be tested in it. Each end of the box had a 4-inch observation hole in it, photo No. 44.

Before making the test the pipe was carefully examined and measured. Sufficient sand was put in box so that when pipe was placed on it, the centre of the pipe would be opposite the observation hole of the end plate. The felt gasket was snugly fitted to the pipe ends. A little more sand was put in and tamped carefully and tightly so that the pipe would have an evenly distributed load on it. A few inches of sand were added followed by tamping till the box was full flush with the top. The ram or lid was carefully centred on top of the sand and

then by means of a series of I-beams and cast iron bars the load from the machine was evenly distributed to the surface of the sand which had an area of 650 square inches.

With everything in place an electric bulb was put in one end of the pipe and the observer stationed at the 4-inch opening at the other end. With the small sizes 4 inch, 6 inch and 8 inch, the load was added in increments of 5,000 lbs. The pipe and apparatus being examined after each addition, the load was increased till one could hear a sharp cracking sound. At this point the machine was stopped and the load read off. In each case just two cracks could be observed running longitudinally the entire length of the pipe exactly at the top and bottom of the pipe.

With the larger sizes 9 inch, 12 inch, and 15 inch we measured the deflection or change in diameter in vertical and horizontal planes, by means of a small instrument that could be read to the ten-thousandth part of an inch. While taking these readings the load was added in increments of 2,500 lbs. With some samples we took readings up to a point near the breaking point and then released the load, noting that the diameter returned to normal again with the load off.



As the pipe did not fly into pieces it was possible to make deflection readings right up to the point of fracture.

Having broken the pipe the ram was removed and the sand dug out till the top surface of the pipe appeared. The crack that was readily seen from the inside could scarcely be discerned from the outside.

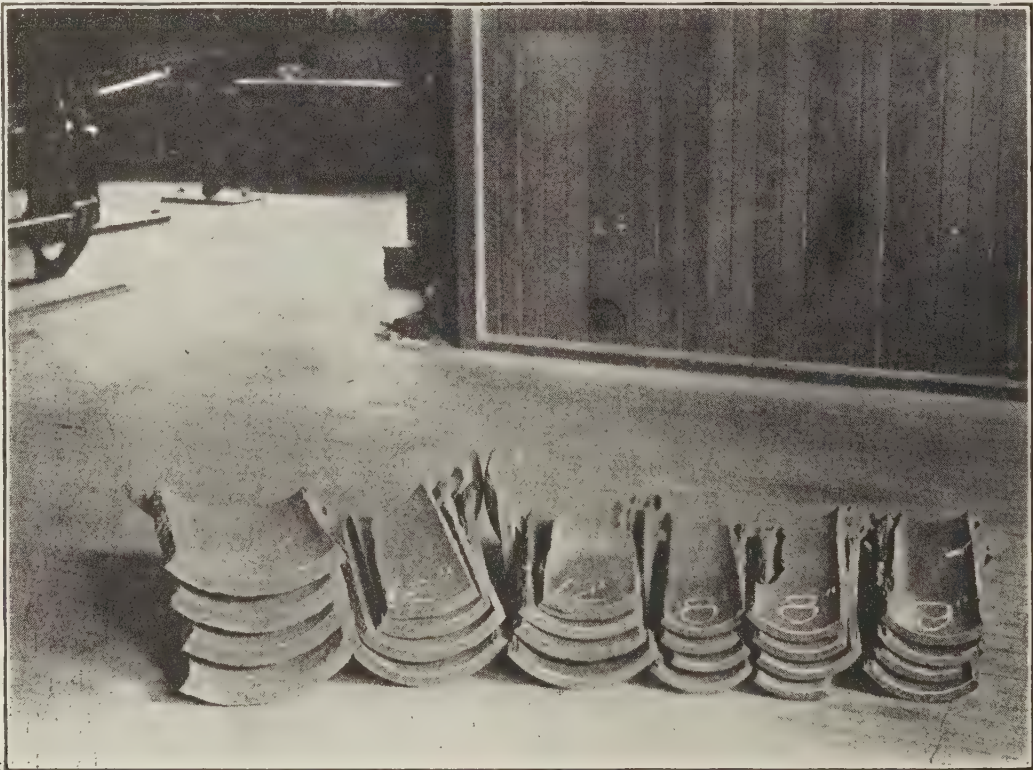
On cleaning out the sand till half the pipe was exposed, in nearly every case one could observe a crack running longitudinally along both sides of the pipe at points just a little above a horizontal plane through its centre. These cracks were seldom noticeable from the inside. This led us to conclude that the pipe was bending outward at these points. The deflection needle showed us that such was the case. The diameter in a vertical plane through the centre of the pipe decreased under a load and the diameter through a horizontal plane through the same point increased as the load in the pipe increased.

TABLE No. 13.

Showing change in diameter in a vertical plane through the centre of the pipe when subjected to an increasing load. Measurements in $\frac{1}{10000}$ inch.

Lbs. pressure on ram.	Deflections in $\frac{1}{10000}$ inch.						
	No 14.	15	16	17	18	19	20
2,500 lbs	12	7	10	17	10	4	11
5,000 “	17	11	20	30	16	12	15
7,500 “	26	20	30	45	25	17	21
10,000 “	37	30	41	62	34	23	25
12,500 “	46	41	51	80	45	32	31
15,000 “	57	52	61	97	55	42	37
17,500 “	67	62	71	110	66	52	42
20,000 “	78	352	80	131	77	59	52
22,500 “	89	.....	91	531	.....	68	62
25,000 “	100	.....	109	.....	.....	74	77
27,500 “	112	.....	219	.....	.....	200	93
30,000 “	125	.....	.....	.....	.....	.....	112
32,500 “	136	.....	.....	.....	.....	.....	127
35,000 “	147	.....	.....	.....	.....	.....	197
37,500 “	181	.....	.....	.....	.....	.....	.....
Size of pipe	12"	12"	12"	15"	15"	15"	15"

[The most flexible of the above samples showed a deflection of $\frac{147}{10000}$ " before it cracked, or a twelve-inch pipe bent in only $1\frac{1}{2}$ one-hundredths of an inch before breaking.]



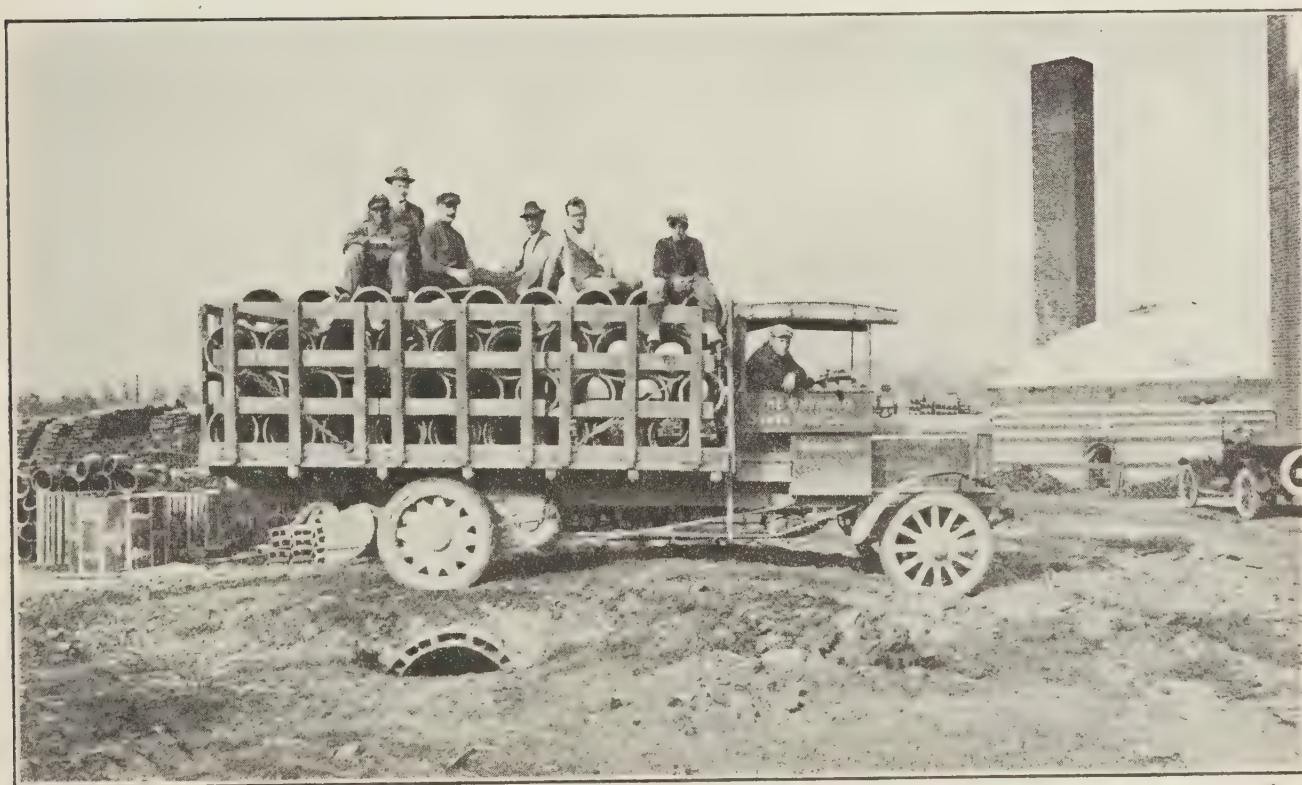
The result of external pressure on sewer pipe is that they break longitudinally in almost equal segments.

The specimen was removed from the box and if it did not fall into pieces it could readily be pulled apart by hand, breaking up into four almost equal segments.

Table No. 14 contains the record of the testing observations.



Sewer pipe used on the Good Road construction, Toronto-to-Hamilton Highway.



Testing segment block with a 7-ton truck, Mimico.

TABLE

No.	Size	Mfr.	Thickness of shell.	Inside Spigot.	Outside Spigot.	Inside Bell.	Outside Bell.	Depth of Bell.	Length over all.	Color.	Ring.	How burned.	Glaze.
1	4"	Ontario ..	inch $\frac{9}{16}$	inch $3\frac{3}{4}$	inch $5\frac{1}{4}$	inch $5\frac{3}{4}$	inch $6\frac{3}{4}$	inch $1\frac{3}{4}$	inch $25\frac{1}{2}$	dark brown	very clear	hard	fair
2	4"	"	$\frac{9}{16}$	$3\frac{3}{4}$	$5\frac{1}{4}$	$5\frac{3}{4}$	$6\frac{3}{4}$	$1\frac{3}{4}$	$25\frac{1}{2}$	"	"	"	"
3	4"	Hamilton .	$\frac{5}{8}$	$3\frac{7}{8}$	$5\frac{1}{8}$	$5\frac{3}{4}$	$6\frac{5}{8}$	$1\frac{3}{4}$	$25\frac{3}{4}$	dk br.	very clear	hard	good
4	4"	"	$\frac{5}{8}$	$3\frac{7}{8}$	$5\frac{1}{8}$	$5\frac{3}{4}$	$6\frac{5}{8}$	$1\frac{3}{4}$	$25\frac{3}{4}$	"	"	"	"
5	6"	Ontario...	$\frac{5}{8}$	6	$7\frac{1}{4}$	$8\frac{1}{4}$	$9\frac{1}{2}$	2	25	light brown	clear	"	none
6	6"	"	$\frac{5}{8}$	6	$7\frac{1}{2}$	$8\frac{1}{4}$	$9\frac{3}{4}$	2	$25\frac{3}{4}$	"	"	"	less thanfr
7	6"	Hamilton .	$\frac{3}{32}$	$5\frac{3}{4}$	$7\frac{1}{8}$	8	9	2	$25\frac{1}{2}$	dk. br.	"	very hard	fair
8	6"	"	$\frac{11}{16}$	$5\frac{3}{4}$	$7\frac{1}{8}$	$8\frac{1}{2}$	$9\frac{1}{4}$	2	26	brown	"	hard	"
9	8"	Ontario ..	$\frac{3}{4}$	8	$9\frac{1}{2}$	$10\frac{1}{2}$	$11\frac{1}{2}$	2	26	dk. br.	very clear	"	good
10	8"	"	$\frac{13}{16}$	$8\frac{1}{16}$	$9\frac{3}{4}$	$10\frac{5}{8}$	$11\frac{3}{4}$	$2\frac{1}{4}$	26	lt. br.	fair	med. or soft	hardly fair
11	9"	Hamilton .	$\frac{13}{16}$	9	$10\frac{9}{16}$	$11\frac{5}{8}$	$12\frac{1}{2}$	$2\frac{1}{8}$	26	dk. br.	good	med hard	good
12	9"	"	$\frac{13}{16}$	$9\frac{1}{8}$	$10\frac{5}{8}$	$11\frac{3}{4}$	$12\frac{3}{4}$	$2\frac{1}{8}$	$26\frac{1}{4}$	"	fair	soft	fair
13	12"	Ontario...	1	12	$13\frac{3}{4}$	15	$16\frac{1}{2}$	$2\frac{1}{4}$	$26\frac{1}{4}$	grey'h br.	"	hard	none
14	12"	"	1	12	14	$15\frac{1}{4}$	$16\frac{3}{4}$	$1\frac{1}{4}$	$26\frac{1}{4}$	lt. br.	ex.	"	fair
15	12"	Hamilton .	$\frac{15}{16}$	$11\frac{7}{8}$	$12\frac{3}{4}$	$14\frac{5}{8}$	$16\frac{1}{8}$	$2\frac{1}{2}$	$26\frac{1}{4}$	dk. br.	good	med. hard	good
16	12"	"	1	12	14	$14\frac{7}{8}$	$16\frac{1}{8}$	$2\frac{5}{8}$	$26\frac{1}{4}$	"	fair	"	"
17	15"	Ontario...	$\frac{13}{8}$	$15\frac{1}{4}$	18	19	21	$3\frac{1}{4}$	$27\frac{1}{8}$	lt. br.	good	hard	none
18	15"	"	$\frac{13}{8}$	$15\frac{1}{4}$	18	19	21	$3\frac{1}{4}$	$27\frac{1}{8}$	"	"	"	"
19	15"	Hamilton .	$1\frac{5}{16}$	$14\frac{3}{4}$	$17\frac{1}{4}$	19	$21\frac{1}{4}$	3	$26\frac{5}{8}$	dk. br.	ex.	very hard	good
20	15"	"	$1\frac{5}{16}$	$14\frac{3}{8}$	$17\frac{5}{8}$	$19\frac{1}{8}$	$21\frac{1}{4}$	3	$26\frac{5}{8}$	br.	good	med. hard	"

No. 14.

Flaws.	Sand under Spiggot.	Under bell.	Sides of Spiggot.	Sides of bell.	Over Spiggot.	Over bell.	Load on ram.	% Absorp- tion.	Lbs. per sq. inch.	Load per running ft. of pipe.	Deflection of diam. at breaking pt.	Remarks.
	inch.	inch	inch.	inch	inch	inch.	lbs.	%	lbs.	lbs.		
none	12	11	10	9	17½	16½	60,000	3.5	92	5,216	.....	Broke longitudi- nally in almost equal segments Pipe did not crack Sample did not crack.
"	12	11	10	9	17½	16½	75,000	.....	115	6,380	.....
"	12	11	10	9	17½	16½	80,000	2.3	123	6,740	.....
"	12	11	10	9	17½	16½	75,000	.....	115	6,330	.....
"	10½	9¼	9	7¾	16½	15¼	50,000	1.3	77	6,003	.....
"	10½	9	9	7¾	16½	15¼	47,500	5.0	73	5,899	.....
"	10½	9¼	9	7	16½	15¼	59,000	1.7	91	6,956	.....
"	10½	9¼	9	7	16½	15¼	50,500	3.2	78	5,953	.....
"	9¾	8¾	7¾	6¾	15¼	14¼	50,000	1.0	77	7,866	.....
"	9¾	8¾	7¾	6¾	15¼	14¼	37,500	4.8	57	6,120	.....
"	9¼	8¼	7¼	6¼	14¾	13¾	33,500	6.5	51	5,800	.....
"	9¼	8¼	7¼	6¼	14¾	13¾	26,000	4.1	40	4,450	.....
"	7¾	6¼	5½	4½	13½	12¼	50,000	2.2	77	11,400	.....	This was a par- ticularly tough specimen, tho' not a fine look- ing pipe.
"	7	5¾	5½	4½	13½	12¼	37,500	1.0	57	8,700	$\frac{147}{10000}$	
"	7¾	6¼	6	4½	13½	12¼	20,000	2.0	30	4,550	$\frac{70}{10000}$	
"	7½	6½	5½	4½	13½	12¼	27,500	6.1	42	6,400	$\frac{108}{10000}$	
"	5½	4½	3½	2½	11	8¾	25,300	4.1	39	7,460	$\frac{131}{10000}$	
"	5½	4½	3½	2½	11	10	27,500	3.1	42	8,200	.....
firec'k in bell	5¾	4½	3¾	2½	11¾	10	25,000	1.0	38	7,140	$\frac{80}{10000}$	This sample was very brittle, very hard burned, but not tough.
"	5¾	4½	3¾	2½	11¾	10	30,000	1.5	46	8,700	$\frac{90}{10000}$	

The results show that the smaller pipes are capable of taking greater trench loads than the larger pipes. Certainly a much greater load per square inch is necessary to crack them. The column headed load per running foot does not show as great variation for different sizes as some of the other columns, because although the load per square inch in the sand may be greater for the smaller

TABLE NO. 15.
Trench Pressures for Sewer Pipe, in Pounds per Linear Foot.

Height of Fill above Top of Pipe. ft.	Breadth of Ditch a Little Below Top of Pipe.									
	1 ft.		2 ft.		3 ft.		4 ft.		5 ft.	
	Ditch Filling Material.		Ditch Filling Material.		Ditch Filling Material.		Ditch Filling Material.		Ditch Filling Material.	
	Sand.	Clay.	Sand.	Clay.	Sand.	Clay.	Sand.	Clay.	Sand.	Clay.
2.....	220	235	510	530	805	825	1,105	1,125	1,405	1,425
4.....	335	375	880	935	1,455	1,520	2,045	2,115	2,635	2,710
6.....	390	455	1,140	1,250	1,975	2,105	2,840	2,980	3,715	3,865
8.....	420	505	1,335	1,490	2,395	2,595	3,515	3,745	4,660	4,910
10.....	440	535	1,470	1,680	2,730	3,010	4,085	4,410	5,490	5,850
12.....	445	550	1,565	1,825	3,000	3,355	4,570	5,000	6,220	6,695
14.....	450	560	1,635	1,935	3,215	3,650	4,980	5,515	6,855	7,460
16.....	455	565	1,690	2,020	3,385	3,895	5,330	5,970	7,410	8,145
18.....	455	570	1,725	2,085	3,525	4,100	5,625	6,360	7,900	8,770
20.....	455	575	1,750	2,135	3,640	4,275	5,875	6,715	8,330	9,325
22.....	455	575	1,770	2,175	3,725	4,420	6,090	7,020	8,705	9,830
24.....	455	575	1,785	2,205	3,800	4,545	6,270	7,290	9,035	10,285
26.....	455	575	1,795	2,230	3,855	4,645	6,420	7,530	9,325	10,690
28.....	455	575	1,800	2,245	3,905	4,735	6,550	7,735	9,575	11,060
30.....	455	575	1,805	2,260	3,940	4,805	6,660	7,920	9,795	11,395
Very great..	455	575	1,820	2,310	4,090	5,190	7,270	9,230	11,365	14,425

'Prepared from the Standard Specifications for Drain Tile (Serial Designation: C 4-16), 1916 Book of A.S.T.M. Standards, p. 452. "The table gives safe trench pressures for sewer pipe, for sand and thoroughly wet clay ditch filling material. It has been prepared for a safety factor of 1½ which has been found necessary to prevent cracking from the loads of ditch filling."

pipe, the larger pipe have more surface per running foot; or 91 lbs. per square inch on a six inch pipe gives less load per running foot than 42 lbs. per square inch for a 12-inch pipe.

The trench load per foot run is probably not in this ratio. Observe table No. 15 recommended for use in sewer design.

TABLE No. 16.
Stresses if uniform load is assumed.

Size.	4 inch.	6 inch.	8 and 9 inch.	12 inch.	15 inch.
	lbs.	lbs.	lbs.	lbs.	lbs.
Lbs. per square inch.....	111	80	56	51	41
Average load per running foot	6,166	6,152	6,060	7,760	7,870
Lbs. per sq. in. × 12 × dia. (inches)...					

These figures on Canadian pipe are much higher than are given for United States pipe. This may be because our pipe is stronger and tougher or because of our method of estimating the load.

According to the table No. 16, all the sizes tested of the Canadian pipe were many times the strength required to carry the load of the deepest trench. A safety factor of $1\frac{1}{2}$ is usual for this class of material.

The local sewer pipe of standard size appear to be strong enough to resist any load that might be applied in practice.

The strength of sewer pipe depends on the most important step in its manufacture, vitrification.

The most thoroughly vitrified and annealed pipe will best resist internal pressure, external pressure, mechanical erosion and chemical action.



Office and dray, Hamilton-Toronto Sewer Pipe Co., Ltd.

4.—SPECIFICATION FOR VITRIFIED CLAY SEWER PIPE.

Quality All standard sewer pipe and specials shall, unless otherwise specified, be of the best quality of vitrified clay salt glazed sewer pipe, of the bowl and spiggot pattern, and shall be true to form and size.
Clay sewer pipe shall be of the following sizes and dimensions:—

TABLE No. 17.

Proposed Standard Sizes and Dimensions of Clay Sewer Pipe.

Diameter.	Thickness.	Depth of Socket.	Annular Space.
Inch.	Inch.	Inch.	Inch.
6	$\frac{3}{4}$	$2\frac{1}{2}$	$\frac{1}{2}$
8	$\frac{3}{4}$	$2\frac{3}{4}$	$\frac{1}{2}$
9	$\frac{7}{8}$	$2\frac{3}{4}$	$\frac{1}{2}$
10	$\frac{7}{8}$	$2\frac{3}{4}$	$\frac{1}{2}$
12	1	3	$\frac{1}{2}$
15	$1\frac{1}{4}$	3	$\frac{3}{4}$
18	$1\frac{1}{2}$	$3\frac{1}{4}$	$\frac{3}{4}$
20	$1\frac{3}{8}$	$3\frac{1}{2}$	$\frac{3}{4}$
24	2	4	1
30	$2\frac{1}{2}$	$4\frac{1}{2}$	1

TABLE No. 17 A.

Alternative Sizes and Dimensions of Clay Sewer Pipe.

D Internal Circular Diameter.	L Laying Length.	H Diameter at Inside of Hub.	S Depth of Hub.	B Taper of Hub.	T Minimum Thickness of Shell.
in.	Feet.	in.	in.		in.
6	2	$8\frac{1}{4}$	2	1:20	$\frac{5}{8}$
8	2, $2\frac{1}{2}$, 3	$10\frac{3}{4}$	$2\frac{1}{2}$	1:20	$\frac{3}{4}$
9	2, $2\frac{1}{2}$, 3	$11\frac{1}{5}$	$2\frac{1}{2}$	1:20	$\frac{7}{8}$
10	2, $2\frac{1}{2}$, 3	13	$2\frac{1}{2}$	1:20	$\frac{7}{8}$
12	2, $2\frac{1}{2}$, 3	$15\frac{1}{4}$	3	1:20	1
15	2, $2\frac{1}{2}$, 3	$18\frac{3}{4}$	2	1:20	$1\frac{1}{4}$
18	2, $2\frac{1}{2}$, 3	$22\frac{1}{4}$	3	1:20	$1\frac{1}{2}$
20	2, $2\frac{1}{2}$, 3	$25\frac{1}{4}$	$3\frac{1}{2}$	1:20	$1\frac{3}{4}$
21	2, $2\frac{1}{2}$, 3	26	$3\frac{1}{2}$	1:20	$1\frac{3}{4}$
24	2, $2\frac{1}{2}$, 3	$29\frac{1}{2}$	$3\frac{1}{2}$	1:20	2
27	3	$33\frac{1}{4}$	4	1:20	$2\frac{1}{4}$
30	3	37	$4\frac{1}{2}$	1:20	$2\frac{1}{2}$
33	3	$40\frac{1}{4}$	5	1:20	$2\frac{5}{8}$
36	3	44	5	1:20	$2\frac{3}{4}$
39	3	$47\frac{1}{4}$	5	1:20	$2\frac{7}{8}$
42	3	51	5	1:20	3

Note.—When pipes are furnished having an increase in thickness over the dimensions given in column T, then the diameter of the hub H shall be increased by an amount equal to twice the increase of thickness of shell.

Curved pipes, bends, slants, and branches are to be equal in all essential respects to the straight pipes of the same diameter.

All pipes and specials shall be well vitrified free from blisters, laminations, lime spots and free from cracks and checks extending into the body of the tile in such a manner as to appreciably decrease the strength.

All pipes and specials when struck with a light hammer, shall emit a clear high pitched ring. On fracture the absorption shall not exceed five per cent.

Pipe designated straight shall not vary from a straight line more than one-eighth inch per foot of length.

Curves shall be at angles of 45, 22½, 11¼ degrees, etc., as required. They shall substantially conform to the curvature specified.

The ends of pipe and specials shall be square with their longitudinal axis or tangent.

The specimens shall be sound pieces, with all edges broken, from pipes broken in the crushing or other tests. They shall be from 12 to 20 square inches in area, and shall be as nearly square as can be readily prepared. They shall be free from observable cracks, fissures, laminations or shattered edges.

**Absorption
Test**

Preparatory to the absorption test, the specimen shall be first weighed and then dried in a drier or oven at a temperature of not less than 110°C. (230°F.) for not less than three hours. After removal from the drier, the specimen shall be allowed to cool to a temperature of 20 to 25° C. (68 to 77° F.) and then reweighed.

If the specimen was comparatively dry when taken, and the second weight closely agrees with the first, it shall be considered dry. If the specimen was known to be wet when taken it shall be placed in the drier for a further drying treatment of two hours, and reweighed. If the third weight checks the second the specimen shall be considered dry. In case of any doubt, the specimen shall be redried for two-hour periods, until check weights are obtained.

The balance used shall be sensitive to 0.5 g. when loaded with 1 kg., and weighings shall be read to the nearest gram. When other than metric weights are used, the same degree of accuracy shall be obtained.

The specimen after final drying, cooling and weighing shall be placed with other similar specimens in a suitable wire receptacle, packed tightly enough to prevent jostling, covered with distilled water or rain water, raised to the boiling point and boiled for five hours, and then cooled in water to a final temperature of 10 to 15° C. (50 to 59° F.).

The specimen shall be allowed to drain for one minute, the superficial moisture removed by towel or blotting paper, and then placed upon the balance.

The test result shall be calculated as percentage of the initial dry weight.

All sewer pipes shall be subject to inspection at the factory, trench or other point of delivery by a competent inspector employed by the purchaser or consumer. The purposes of the inspection shall be to cull and reject pipes which, independent of the physical tests herein specified, fail to comply with the requirements of these specifications.

Sewer pipes shall be subject to rejection on account of the following:

(a) Fracture or cracks passing through the shell or hub, except that a single crack at either end of pipe not exceeding two inches in length or a single fracture in the hub not exceeding three inches in width or two inches in length will not be deemed cause for rejections unless these defects exist in more than five per cent. of the entire shipment or delivery.

(b) Blisters where the glazing is broken or which exceed three inches in any diameter, or which project more than 1/8 inch above the surface.

(c) Laminations which indicate large voids in the pipe material.

(d) Fire cracks or hair cracks sufficient to adversely affect the strength, durability or serviceability of the pipe.

(e) Failure to give a clear ringing sound when placed on end and dry tapped with a light hammer.

(f) The presence of any considerable number of lime spots.

(g) The presence of any holes due to presence of vegetable matter in the unburnt clay.

All rejected sewer pipes shall be plainly marked by the inspector and shall be replaced by the manufacturer or seller with pipes which meet the requirements of these specifications without additional cost to the purchaser or consumer.



DEPARTMENT OF THE PROVINCIAL SECRETARY

Suggested Standards for Sewer Construction

By F. A. DALLYN, C.E. (Tor.)

Provincial Sanitary Engineer

CONTENTS

1. PROPOSAL FOR BIDS OR ESTIMATES, ETC.
2. BOND
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5. SPECIFICATIONS, INCLUDING GENERAL CLAUSES

THE PROVINCIAL BOARD OF HEALTH OF ONTARIO

1. Standard Proposal for Bids or Estimates,
Schedule of Measurement, Schedule of
Municipal Prices for Extra Work, 1917.

DESCRIPTION OF WORK.

Together with the work incidental thereto.

2. Sealed bids or estimates for the above work will be received at the office of the Clerk of the of until.... o'clock ..M. on day of 191 ..

3. The time allowed for constructing and completing the sewer and appurtenances will be CONSECUTIVE WORKING DAYS.

4. No bid will be considered unless the bidder shall furnish evidence satisfactory to the that he has the necessary facilities, ability and pecuniary resources to fulfill the conditions of the contract and specifications.

5. The amount of security to be deposited with the Bid or Estimate is (\$) Dollars (equal to 10 per cent. of the Bond).

6. The person or persons making a bid or estimate, shall furnish the same in a sealed envelope, endorsed with the title of the work given above, for which the estimate is made, with his or their name or names and the date of presentation to the clerk of of at, on or before the date and hour above named, at which time and place the estimates received will be publicly opened by clerk of the of and read, and the award of the contract made according to law as soon thereafter as practicable. No bid shall be withdrawn pending the award.

7. Each bid or estimate shall contain the name and place of residence of the person making the same; the names of all persons interested with him therein, and if no other person be so interested, it shall distinctly state that fact; also that it is made without any connection with any other person making an estimate for the same purpose, and is in all respects fair and without collusion or fraud, and that no member of the of the of or other officer of the of is, shall be or become interested, directly or indirectly, as contracting party, partner, stockholder, surety or otherwise, in or in the performance of the contract, work or business to which it relates, or in any portion of the profits thereof. The bid or estimate must be verified by the oath in writing of the party making the estimate that the several matters stated therein are in all respects true.

8. Each bid or estimate shall be accompanied by the consent, in writing, of two householders or freeholders in the Province of Ontario, with their respective places of business or residence, or of an authorized and approved (incorporated) surety company, to the effect that if the contract be awarded to the person making the estimate they will, upon it being awarded, become bound as his sureties for its faithful performance; and that if he shall omit or refuse to execute the same, they will pay to the of any difference between the sum to which he would be entitled upon its completion and that which the corporation may be obliged to pay to the person to whom the contract may be awarded at any subsequent letting; the amount in each case to be calculated upon the estimated amount of the work by which the bids are tested. The consent above mentioned shall be accompanied by the oath or affirmation in writing of each of the persons signing the same, that he is a householder or freeholder in the Province of Ontario

and is worth the amount of the security required for the completion of the contract as stated in the proposal, over and above all his debts of every nature, and over and above his liabilities as bail, surety and otherwise; that he has offered himself as a surety in good faith, and with an intention to execute the bond required by law if the contract shall be awarded to the person or persons for whom he consents to become surety. The adequacy and sufficiency of the security offered to be approved by the of the of after the award is made and prior to the signing of the contract.

9. The bond shall be in the form approved by the of and attached hereto. The expense of preparing the contract and bond is to be paid by the corporation, but the expense of getting the same executed, if any, is to be borne by the contractor.

The amount of the bond required for this contract is fifty (50) per cent. of the Contractor's Bid.

10. No estimate will be received or considered unless accompanied either by a certified cheque upon one of the chartered Canadian Banks located in the of, drawn to the order of the or money or corporate stock or certificate of indebtedness of any nature issued by the of which the shall approve as of equal value with the security required, to an amount of ten per centum of the amount of the bond required, as provided for the faithful performance of the contract. Such cheque, money or other form of security must not be enclosed in the sealed envelope containing the estimate, but must be handed to the officer or clerk of the of who has charge of the estimate box, and no estimate can be deposited in said box until such cheque, money or other form of security has been examined by said officer or clerk and found to be correct. All such deposits, except those of the lowest three bidders, will be returned to the persons making the same within ten days after the opening of the bids; within three days after the decision as to whom the contract is to be awarded the deposits will be returned to the remaining persons making the same, except the deposit made by the bidder whose bid has been accepted. If the successful bidder shall refuse or neglect within five days after notice that the contract has been awarded to him, and after that the adequacy and sufficiency of the security offered has been approved by the of the of to execute the same, the amount of the deposit made by him shall be forfeited to and retained by the corporation of the of but if he shall execute the contract within the time aforesaid, the amount of this deposit will be returned to him within three days after the execution of the said contract.

11. Bulk Sum Bids for the whole work or individual contract only will be accepted, and it is further required that the contractor shall

execute whatever additional or extra work may be required at the municipal rates specified in the Description of Work under Schedule of Measurement and in strict conformity in all respects with the requirements of the contract and specification for the proposed work.

12. Contractors desiring to submit bids for both the work as a whole or for any individual project must do so on separate bids. Contractors will not be asked to undertake individual contracts who have only bid on the same when considering the work as a whole.

SCHEDULE OF MEASUREMENT

13. Measurements are taken nett, any general or local custom to the contrary notwithstanding; unless where specially mentioned otherwise.

The work not herein provided for and ordered by the Engineer will be measured up, on completion and the actual amount of extra work executed paid for at the prices marked "municipal rates" stated opposite each description of work in the Schedule of Measurement.

Schedule municipal prices shall include the cost of all labour, material, carriage, plant and machinery of every description for carrying on and completing the contract in the most approved and tradesmanlike manner to the satisfaction of the Engineer.

It is especially requested that Contractors make themselves thoroughly acquainted with the nature of the work previous to submitting a Bid or Estimate.

DESCRIPTION OF WORK

Quantities		Description of Work	Municipal Rate	Contractor's Estimate	Amount
Yds. Ft. Ins.		PAVEMENT.			
		Sup'l .....pavement to lift, lay aside and reinstate as bottoming, include for making up surface of road with new			
		..... on completion of work, rolling and consolidating to the satisfaction of the Engineer			
		Sup'l pavement Do.....			
		Lin. ....curb and gutter Do.			
		Lin. curb replaced Do.			
		Sup'l concrete sidewalks replaced			
		Sup'l flagstone sidewalks replaced			
		Sup'l brick Sidewalk			
				
		Sup'l .....pavement			
				
		Lin. ....curb and gutter			
				
		Lin. ....curb and gutter			
				
		Sup'l concrete sidewalk			
				
		Sup'l sidewalk			
				
		Sup'l sidewalk			
				
		EXCAVATION.			
		Cube excavations in track of sewer for			
		..... pipe average depth			
		greatest depth			
		planking and walings and struts of sufficient strength, rate to include re-filling track in			
		layers, watering and beating and thoroughly consolidating the refilled material and removal of surplus excavated material to a deposit found by contractor or at the following sites			
				
				
		Cu. yd. trench not more than 11 ft. deep. Cu. yd. trench 11 to 15 ft. deep. Cu. yd. trench 15 to 25 ft. deep. Cu. yd. trench each 5 ft. below 25 ft. deep. Cu. yd. tunnel drifts.			

DESCRIPTION OF WORK.—Continued.

Quantities	Description of Work	Muni- cipal Rate	Contract- or's Estimate	Amount
Yds. Ft. Ins.	Cube. Do. Do. for pipe average depth greatest depth Cube. Tunnel for Cube. Do. Extra over ordinary ex- cavations in manhole shafts...Do., Do. Cube. Excavation in rock. Work ordered by Engineer other than that asked for in estimate..... <div>MASONRY.</div> Cube. Concrete "Class" form- ing ..........Municipal rate inclusive reinforced cement Cube. Concrete "Class" laid Municipal rate includes reinforcement Cube. Concrete "Class B" in founda- tions Cube. Concrete "Class C" in founda- tions Cube. Concrete in "Class D" in foundations and backing Sup'l. Concrete "Class E" thick Allow for connecting to existing..... .....vitrified brickwork not specified in place Lin..... Composition brickwork in manholes built and neatly pointed on inside face with cement mortar, price to include plumbings, cuttings and waste. Cube. Sewer brickwork			

DESCRIPTION OF WORK.—Continued.

Quantities	Description of Work	Muni- cipal Rate	Contract- or's Estimate	Amount
Yds. Ft. Ins.	LUMBER.			
	..... B.M. ....in foundations			
	..... M.B.M.			
	..... B.M. sheeting, braces,			
	shores, stringers, waling strips, left in			
	place by order			
	..... M.B.M.			
	..... B.M. sheet piling			
	..... M.B.M.			
	Lin....Circular timber—cedar, tam-			
	arac and other timber 8 inches diam-			
	eter at small end .....Lin. Ft			
	Lin. Piles driven only according to			
	instructions of Engineer			
	..... Lin. Ft			
	PIPE AND PIPE LAYING.			
	Lin. diameter standard salt-			
	glazed bowl and spigot sewer pipe to			
	provide, lay and joint with			
	..... and Portland cement			
	mortar.			
	.....Pipe laid and jointed in trench			
	..... per ft.			
	.....Pipe laid and jointed in trench			
	..... per ft.			
	.....Pipe laid and jointed in trench			
	..... per ft.			
	.....Pipe laid and jointed in trench			
	..... per ft			
	CONNECTIONS.			
	.....inch slants built in new			
	brick sewers .....each....			
	.....inch slants built in....			
	..... sewers each....			
	..... Pipe (2 ft. length) built in			
	brickwork or concrete each....			
	..... Pipe (2 ft. length) Do.			
	..... each....			
	..... Pipe (2 ft. length) Do.			
	..... each....			

DESCRIPTION OF WORK.—Continued.

Quantities	Description of Work	Muni- cipal Rate	Contract- or's Estimate	Amount
Yds.Ft. Ins.	.....Junctions laid and jointed in trench each.... .....Junctions laid and jointed in trench each.... .....Junctions laid and jointed in trench each.... <div>BENDS. .....Bends inserted at..... ..... .....Bends inserted at..... ..... .....Bends inserted at..... ..... .....Bends inserted at.....</div> <div>UNDERDRAINS. Lin. tile underdrains as ordered, including excavations below sub-grade, laying and ballasting Lin. ft Lin. vitrified pipe underdrains Do. Lin: ft.</div> <div>MANHOLES. Sup'l. Portland cement concrete thick in bottoms of manholes hollowed and shaped as shown, and smoothed on upper surface with cement mortar (.....). Manhole steps formed of 1 inch diam- eter galvanized malleable iron, each long with bent and palmed ends, built into brickwork Cast iron manhole covers No. coated with Dr. Angus Smith's patent solution, rate to include bedding and setting in cement mortar. Cube. Cement concrete .....thick round cast iron manhole heads Lin. Manhole ladders galvanized</div> <div>CATCH BASINS. Concrete and brick masonry elsewhere provided for</div>			

DESCRIPTION OF WORK.—Continued.

Quantities	Description of Work	Muni- cipal Rate	Contract- or's Estimate	Amount
Yds. Ft. Ins.	.....Gulley traps and tops sup- plied by connection to sewer, distance not to exceed feet except when ordered by Engineer as extra work...			
	FLUSH TANKS. Concrete and brick masonry elsewhere provided for			
	.....Syphons to be supplied by contractor connection to sewer			
	GENERAL ALLOWANCES. Allow for removal of surplus material or rubbish of whatever kind other than that already specified to a de- posit found by Contractor Allow for furnishing and fitting up all necessary troughs or other appliances, including pumps which may be re- quired for conveying water over, or past the works and keeping the trench dry during the construction of the sewer Allow for making good all injuries to persons or property which may result through the execution of the works; and the settling of all claims in respect thereof Allow for carefully supporting all gas and water pipes in line of work, and making good any damage which may result to same Allow for lighting, watching and bar- ricading the works to the satisfaction of the authorities Allow suitable office for Clerk of Works, with stove, providing fuel and daily cleaning Allow for providing all temporary roadways, footways, bridges, etc., for the use and convenience of the public. Allow for all necessary scaffolding ... Allow for maintaining the work for calendar months after com- pletion Allow for engineering and inspection. Allow for work incidental to contract not elsewhere provided for Allow for Bond issue depreciation ...			
	Total amount of Estimate			

MUNICIPAL RATES FOR ALLOWANCES.

			Dollars	Cents
Price per	.....	for Mason	.....
Do.	Do.	Causeway layers..		
Do.	Do.	Bricklayer	.....
Do.	Do.	Labourers	.....
Do.	Do.	Watchman	.....
Do.	Do.	Team and Wagon,		
		with man.....		

14. The estimated quantities are believed to be accurate for the material listed only and are given for the convenience of the contractor; they are not guaranteed to completely specify the work comprised in the contract and are not to be considered as limiting the contract to the before mentioned quantities. Such as can, should be checked and verified by the bidders after a careful examination of the plans, specifications and the location or site of the work.

15. For the convenience of contractors blue prints will be issued. These blue prints are to be returned under separate cover with the contractor's bid.

16. Bidders will be required to complete the entire work to the satisfaction of the Engineer of the of and in substantial accordance with the specifications hereunto annexed and the plan therein referred to. No extra compensation beyond the amount payable for the several classes of extra work ordered by the Engineer in charge of the work, in writing, which shall be actually performed at prices therefor specified in the contract, shall be due or payable for the entire work.

17. The contractor's estimates are to be included and to cover the furnishing of all material and the performance of all the labour requisite or proper for the purpose, and the building and completing of all the above mentioned work, of the materials and in the manner set forth, described and shown in the specifications and on the plan of the work.

18. Bidders are particularly requested to examine the plan, specification and location of the work before bidding. Bidders are informed that no deviations from the specifications will be allowed.

19. Bidders are especially notified that the reserves the right to determine the times and places for commencing and prosecuting the work, and that the principal reserves the right to require that the work shall be done during daylight or working hours, notwithstanding unfavourable weather or other conditions. Postponement or delay on the whole, or any part thereof, occasioned by the precedence of other contracts, which may be either let or executed before or after the execution of the contract for this work, can constitute no claim for damages, nor for a reduction of the damages fixed for delay in completing the work beyond the time bid.

20. The price should be written in the bid and also stated in figures, and all estimates may be considered as informal which do not contain bids for all items for which prices are herein called. Permission will not be given for the withdrawal of any bid or estimate, and the right is expressly reserved by the of the of to reject all bids should they deem to the corporation's interest to do so. No bid will be accepted from, or contract awarded to, any person who is in arrears to the of upon debt or contract, or who is a defaulter, as surety or otherwise, upon any obligation to the of

21. Where test pits have been dug along the line of the work the location of the same with the character of the material encountered therein is shown on the contract plan. The corporation of the of, does not guarantee, however, that the materials to be excavated will be even approximately like that indicated on the contract plan. Intending bidders will be permitted to dig additional test pits at their own expense under the supervision of the Engineer of the of providing all conditions regarding safety of the existing works.

22. The following documents and plans are parts of this contract and are held of equal force and effect:
- (a) The advertisement for proposals as published in the papers.
 - (b) Proposal for bids.
 - (c) Bid or Estimate.
 - (d) Bond.
 - (e) Contract and Specifications.
 - (f) The approved drawings and plans furnished by the of the of



DEPARTMENT OF THE PROVINCIAL SECRETARY

THE PROVINCIAL BOARD OF HEALTH OF ONTARIO

2. STANDARD BOND, 1917

The proposed sewers for the of

This Bond refers to Contract for
.....
.....
.....
.....
.....
.....
.....
.....
.....
together with all work incidental thereto.

Date of Contract
Date of order to commence
Date of work to be completed
Date of Completion
Name of Contractor
.....
Name of Sureties
.....

Surety Bonds usually cost the Contractor one half ($\frac{1}{2}$) per cent. of the amount of the contract, per annum, and provide surety of fifty (50) per cent. of the contract price.
If maintenance clauses are in the contract additional rates are charged amounting usually to twenty-five (25) per cent. per annum of the first premium.

BOND

KNOW ALL MEN BY THESE PRESENTS, That we
.....
..... as Principal,
and
.....
.....
as Sureties, are held and firmly bound unto the
of in the sum
of Dollars,
for the payment of which, well and truly to be made, we do hereby
jointly and severally bind ourselves, our heirs, successors and administra-
tors, firmly, by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, That,
whereas, the said above named principal did on the
..... day of 191 , enter into the foregoing agree-
ment with the of which said agreement is made
a part of this bond the same as though fully set forth therein.

NOW, if the said part of the second part of the said
foregoing agreement, shall well and truly execute all and singular the
stipulations of said agreement by to be executed, and
shall pay all just and legal claims for labour performed upon, and for
materials and machinery furnished for the work specified in the said
agreement, this obligation to be void, otherwise to remain in full force
and virtue in law; we agreeing and hereby consenting that this under-
taking shall be for the use of any labourer or material man, having a
just claim as aforesaid, as well as for the of, and,
further, that the parties to the foregoing agreement may from time to
time and, as often as they see fit, make any addition to, omissions from,
or modification of the work and the said agreement, which in the judg-
ment of the said parties do not materially increase the liability thereon,
without consulting the sureties thereto, and without in any way affecting
their liability hereon.

WITNESS OUR SIGNATURE, this day of
191 .

.....
Principal
.....
Principal
.....
Principal
.....
Principal
.....
Surety

Business
Residence, No. Street.
.....
Surety

Business
Residence, No. Street.
.....
Surety

Business
Residence, No. Street.
.....
Witness
.....
Witness

Signed in the presence of
.....
.....



DEPARTMENT OF THE PROVINCIAL SECRETARY

THE PROVINCIAL BOARD OF HEALTH OF ONTARIO

3. Standard for Bids and Estimates, 1917

Proposal

together with the work incidental thereto.

The bidder's name and residence must be inserted here, and in case of firms, the name and residence of each and every member of the firm must be inserted	BID OR ESTIMATE by
	residing at (or place of business)
	and
	residing at (or place of business)
	composing the firm of
	or a company
	duly incorporated by the
	and having their head office at
	To the of

1. DECLARE THAT

of lawful age and the only person interested in this bid; and no person other than herein above named has any interest in this Bid or in the contract proposed to be taken.

2. FURTHER DECLARE that this Bid or Estimate is made without any connection, knowledge, comparison of figures or arrangement with any other person or persons making a bid for the same work, and is in all respects fair and without collusion or fraud.

3. FURTHER DECLARE that no member or officer of the of the of, shall be or become interested directly or indirectly, as a contracting party, partner, stockholder, surety or otherwise in or in the performance of the contract, or in the supplies, work or business to which it relates or in any portion of the profits thereof, or of any such supplies to be used therein, or in any of the moneys to be derived therefrom.

4. FURTHER DECLARE that the several matters stated in the said Bids are in all respects true.

5. The undersigned having carefully examined the locality and site of the proposed works, as well as all the plans, drawings, profiles, Engineer's estimate of quantities, proposal for bids or estimates, bid and estimate, schedule of prices, bond, contract and specification, and all the clauses in the specifications and general conditions, hereby accept the same as part and parcel of this contract, and do hereby bid and offer to enter into a contract to construct the said
.....
.....

Insert here proper description according to general wording of page 255
.....
.....

together with all the work incidental thereto and the removal of all rubbish immediately after the completion of each section, as hereinafter provided; the providing for the present drainage; also all loss or damage arising out of the manner of constructing the work aforesaid, or from the action of the elements or from any unseen obstructions or difficulties which may be encountered in the prosecution of the same and all expenses incurred by or in consequence of the suspension or discontinuance of the work as hereinafter specified, and of a faithful compliance with each and every provision of the specifications for the work, the following prices, viz:—

NOTE.—In case a bid shall be submitted by or on behalf of any Corporation, it must be signed in the name of such Corporation by some duly authorized officer, or agent thereof, who shall also subscribe his own name and office; if practicable the seal of the Corporation should be affixed.

.....
.....
.....
.....
.....
.....

(In the above blank shall be written the extent of the contract, that is, whether several projects are included as one, or a single project, or several projects severally.)

The distinct understanding being that the whole work, comprised under the afore-mentioned heading, including contingencies, is to be completed for the sum bid, except that should any additions to or deductions from the work be made, the price shall be added to or deducted from the contract sum as the case may be and in making additions the Engineer shall adopt the municipal rate shown in the Schedule of Measurement, and in making deductions he shall make them on the basis of fifteen (15) per cent. less than the municipal rates.

The contractor shall be paid in the following manner, viz.:—80 per cent. of the value of the complete work in accordance with the progress certificate of the Engineer (the Engineer's Progress Certificate to include invoice cost of material delivered on contract less 20 per cent.) to be paid monthly on or before the day of each month. Upon completion of the contract, and conditions thereof, the balance then due less 5 per cent. to be paid within thirty days after presentation of the Engineer's final certificate that the contract is complete. The remaining 5 per cent. to be paid subject to the conditions of this contract sixty days after completion of contract.

5. AND ALSO AGREE, if this Bid is accepted, to execute whatever additional work together with such changes as may be ordered at the municipal rates, as specified in the Proposal for Bids, in strict conformity, in all respects, with the requirements of the specifications, general conditions and form of agreement.

In arbitrating extra work not provided for in Proposal for Bids including overhead and plant depreciation, agree that the sworn cost plus 15 per cent. is a just and equitable compensation.

6. And further agree that this offer is to continue open to acceptance until the formal contract is executed by the successful bidder for said work.

7. And, if this Bid is accepted, the undersigned agree to execute the contract and Bond in triplicate within five days after being notified so to do by the of the of And in the event of default or failure on part so to doagree that the of the of shall be at liberty to retain the money deposited by to the use of the of and to accept the next lowest of any Bid, or to advertise for new Bids; or to carry out the

works in any other way they may deem best; and also agree to pay to the said of the of the difference between this Bid and any greater sum which the said Corporation may expend or incur by reason of such default or failure, or by reason of such action, as aforesaid, on their part, including the cost of any advertisement for new Bids; and to indemnify and save harmless the said corporation and the from all loss, damage, cost, charges and expense which they may suffer or be put to by reason of any such default or failure on part.

8. And agree that the awarding of the Contract based on this Bid, by the of shall be an acceptance of this Bid without communication or notice thereof to

9. And propose Mr. of the of the and Mr. of the same place, as sureties, who are willing to become bound with the undersigned for the due performance of the Contract, for which this is a Bid.

Name

Address.

Contractor's } Name
Signature } Address

Witness

10. The undersigned hereby offer to become bound for the above named contractor in the usual bond for the fulfilment of the above-mentioned Contract if awarded to and further agree that if the contractor shall omit or refuse to execute the same, they will pay to the of the of any difference between the sum to which the said contractor be entitled upon its completion and that which the may be obliged to pay to the party to whom the contract may be awarded at any subsequent letting; the amount in each case to be calculated upon the estimated amount of work by which the Bids are tested.

Signatures of }
Sureties. }

Witness

Name and
Name and
Name
being each for himself duly sworn, says that he is owner of real estate in the worth the sum of (\$) over and above all liabilities and encumbrances of every nature.
Sworn before me, this day of 191 ..

.....
Commissioner or Notary Public.

TO WIT:

DOMINION OF CANADA
County of

} IN THE MATTER of a proposed
} Contract for

Do solemnly declare that the several matters stated in the above
Bid are in all respects true.

And make this solemn declaration con-
scientiously believing it to be true, and knowing that it is of the same
force and effect as if made under oath, and by virtue of "The Canada
Evidence Act, 1893."

SEVERALLY DECLARED before
me at the of
in the County of this
day of 191 .

A Commissioner, etc.
(Or Notary Public.)



DEPARTMENT OF THE PROVINCIAL SECRETARY
THE PROVINCIAL BOARD OF HEALTH OF ONTARIO

4. STANDARD CONTRACT, 1917

Description
together with the work incidental thereto.

The foregoing Bid, including Prices and Payment and the general
Conditions form our agreement with the.....
of dated
....., 191... together with the bond or security, the
Proposal for Bids, the Specifications attached thereto, and the plans and
the documents referred to in the said agreement, and the said agreement,
form our contract in this matter.

The Corporation of the
of
.....
Contractor.
.....
.....
Date.
.....
Witness.



DEPARTMENT OF THE PROVINCIAL SECRETARY
THE PROVINCIAL BOARD OF HEALTH OF ONTARIO

5. Specifications Including the Standard General
Clauses, Sections 1-57 inclusive, 1917

1. WITNESSETH, that the parties to these presents, each in con-
Covenant sideration of the agreements on the part of the other herein
contained, have agreed and hereby agree, the party of the
first part for itself, and the party of the second part for itself, or him-
self (themselves) his or their executors, administrators and assigns, as
follows:

2. The “Contract” shall be understood to mean the signed docu-
Contract ment, including the Proposal for Bids or Estimates, the
Bid or Estimate, the Bond, Contract, the specification, the
general conditions, and the signed drawings relating to the work em-
bodying the complete understanding and agreement between the Prin-
cipal and the Contractor. It is understood that from and after the date
of the signing of the contract, all former verbal understandings or
written agreements made prior to the signing of this document apart
from those actually introduced and expressed in the contract are of no
effect. The contract shall be understood to embody the full and com-
plete agreement.

3. Three (3) copies of this agreement shall be executed, one to
Protection of Agreement become the property of the contractor, one the property of
the Principal and the third shall be sealed and deposited in
the safety deposit vault of the Head Office of the Bank of
..... of Ontario,
and the key of such vault shall be left in trust with the manager of the
said bank to be delivered up to the parties or their official representatives
jointly interested upon the presentation of the Certificate of the Engineer
as to Completion of Contract.

4. Any matter in dispute as to liability of the Principal under this agreement shall be judged according to the Engineer's
Extras Schedule of Measurement this document and subsequent orders of the engineer, a triplicate copy of which shall require to be deposited weekly in said vault, envelopes to be marked "To the of the Bank of for deposit in safety deposit vault box No." and shall bear a date and number on the left hand margin.

5. The words "Principal" and "Corporation" shall mean the
"Principal" who agrees to pay for the work and shall include administrators, executors and assigns.

6. The "Contractor" shall mean the person who agrees to do the work, and shall include the bondsmen and sureties, together with his and their heirs, administrators, executors and assigns.
Contractor

7. "Work" shall mean the whole or any part of the work to be done, or materials to be supplied under the contract, whether as
Work originally set forth or as varied by written order of the Engineer.

8. "Wages" shall be interpreted to mean the prevailing rate of wage at the date of signing this agreement and all disputes
Wages involving sums of which wages form a part shall be adjusted on this basis.

9. "Plant" shall mean all appliances or materials which shall be brought to, or constructed upon the site, also animals
Plant which may be required or used in the carrying out of the work.

10. The "Site" shall mean the place where the work is to be performed, or such place as is particularly named or described
Site in the contract, including the approaches thereto. The sites and right-of-way thereto required for the work will be provided by the Principal and be available for the commencement of the work by the Contractor upon the date specified or as herein provided for.

11. "Approved" when used in connection with, or referring to, any drawing, materials, equipment, apparatus, methods, or
Approved other things in connection with the contract, shall mean that the thing referred to shall receive the approval of the Engineer in writing before being ordered done, provided, used or constructed, as the case may be.

12. Wherever the word "Engineer" is used in the specifications or in this contract, it shall refer to and designate the
Engineer Engineer or his assistants, designated by him to act in the premises, limited to the particular duties

intrusted to them. The Engineer shall supply the contractor from time to time and when so requested with a statement setting forth the duties of his assistants acting on the premises. In case the Engineer may not be able to act, then such Engineer as may be designated by the Principal shall act in his place.

Notices 13. All notices, instructions, reports and certificates shall be in writing and signed by the party making the same.

The residence or place of business given in the Bid or Estimate upon which this contract is founded is hereby designated as the place where all notices, letters and other communications shall be served, mailed or delivered. Any notice, letter or other communication addressed to the contractor and delivered at the above named place or his agent in charge

Notices where served, mailed or delivered of the work, or deposited in a postpaid wrapper in any post-office box regularly maintained by the post-office, shall be deemed sufficient service thereof upon the Contractor. The place named may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor and delivered to the Principal or his Engineer. Nothing herein contained shall be deemed to preclude or render inoperative service of any notice, letter or other communication upon the Contractor personally.

Control of work 14. The Engineer shall have the general direction and control of all and every part of the works embraced in this contract, and the same shall be carried on and completed to his entire satisfaction.

15. The plant of the contractor transferred to the site of the contract shall be considered as being the property of the Principal throughout the contract, and in case of the contractor's default may be used by the Principal to expedite the completion of the work and no plant shall be removed without written permission of the Engineer.

Plant to be returned to Contractor upon completion of the work 16. Immediately after the completion of the contract and prior to the adjustment of the several matters as to payment or liability, as the case may be, between the Principal and the Contractor, the Plant shall be transferred to the Contractor responsible under this agreement, and it is agreed that all plant which is no longer required on the work may be removed by the Contractor or upon written permission of the Engineer.

Stakes, lines and levels 17. The Contractor shall give the Engineer at least 36 hours' notice in writing before requiring any levels, lines or stakes of any portion of the works, and he shall clearly state in such notice the exact locality or localities where such are needed for immediate use. The Contractor will be held responsible for the preservation of all stakes and marks in their proper positions, and in case any of them are disturbed, lost or destroyed, after

having been given, he shall at once notify the Engineer in writing, and all expenses incurred by the Principal in replacing the same shall be charged against the Contractor and deducted or collected, as provided in Section 54 of this part. As the stakes and marks set will not in all cases represent all the grades, levels, lines and angles, or change of surface, lines or levels in the finished work, the Contractor must satisfy himself as to the meaning of all stakes, lines and levels before commencing work and shall see that they are taken and read correctly in connection with the plans, details, specifications and Engineer's directions. Should he discover or suspect any errors in the same, he shall at once discontinue work until such errors are investigated and rectified; but no claim shall be made or allowed on account of any alleged inaccuracies.

Removal of persons, plant and material 18. The Engineer may order and enforce the dismissal of any person in the contractor's employ in connection with this contract, whether for insubordination, misconduct, negligence or incapacity, and may also order and enforce the removal of any work or plant which to him appears defective or unsatisfactory and the contractor shall obey such order, and substitute approved work or plant.

Alterations 19. Alterations in the work shall be made only on the order of the Engineer.

Engineer's right to suspend work 20. The Engineer may suspend the whole or any part of the work herein contracted to be done, and during such suspension the excavation in shall be refilled or sheet piled and refilled as the Engineer may require, any roadway over the same properly restored, and all materials delivered upon the work shall be neatly piled so as not to obstruct public travel, or shall be removed from the line of the work if directed by the Engineer, and unless the materials be so piled or removed, as the case may be, by the Contractor upon hour's notice from the Engineer, the materials will be removed by the Principal and the expense thereof deducted from the moneys due or to become due to the contractor under this agreement.

Postpone-ment or delay 21. Should postponement or delay be occasioned by the precedence of other contracts connected with a Public Utility or Local Improvement which may either be let or executed before or after the execution of this contract on the line of the work, no claims for damages therefor shall be made by or allowed to the Contractor; except that if the Contractor shall be delayed in performance of his work by reason of the work or any part thereof being suspended as above provided, such allowance of time as the Engineer shall deem reasonable shall be made by the Principal in the manner hereinafter provided for.

In case it shall be found that for any reason the Corporation

of the of
..... cannot enter upon any of the properties named in
the contract for the purpose of constructing the works, the time for such
construction on such street or property shall be postponed until the con-
ditions are such as to permit the Corporation of the
of to enter upon, occupy and use
said properties for the purpose aforesaid, without prejudice to the con-
tract, or to the right of the of
..... to require the postponed work to be done by
the Contractor under the terms of the contract, and without increased
cost to the of
provided that such postponement shall not exceed three months; should
such postponement affect only a portion of the work to be done the con-
tractor shall be paid for the work completed in the same manner as
though the entire amount of the work named in the contract had been
done and completed.

22. The Engineer, shall, if the Principal or Contractor so request,
give his decision on all matters pertaining to the work,
Decision which decision shall be final and binding on the Principal
final and on the Contractor.

23. The work shall be executed in accordance with the specifications
and the accompanying drawings and such other supple-
Engineer's mentary detailed specifications and drawings as may from
drawings time to time be furnished or approved by the Engineer.

24. In all cases where the Contractor is required to submit drawings
and specifications such drawings and specifications shall
Contractor's be approved by the Engineer prior to the commencing of
drawings the work and the work shall be executed in accordance
therewith. All such drawing shall be furnished and approved in
triplicate.

25. In all cases where shop drawings are required the Contractor
shall furnish three copies of such drawings for the exam-
Shop ination and approval of the Engineer. One set of these
drawings drawings shall be returned to the Contractor by the
Engineer after approval, one set shall be filed and one set retained by
the Engineer. All such drawings and specifications and all necessary
templates shall be furnished with the least possible delay by the Con-
tractor.

26. Should there be any doubt as to the meaning of
Work men= the specifications, Engineer's Schedule of Measurement,
tioned in Municipal rates or any obscurity in the wording of them,
specifications or should there appear to be any discrepancy between them
and not and the plan, the Engineer shall explain them.
shown on
plans

All work and materials required for the proper performance of this
contract mentioned in the specifications and not shown on the plan, and
all work and materials shown on the plant and not mentioned in the

specifications, are to be furnished, performed and done as if the same were both mentioned in the specifications and shown on the plan.

27. If any errors or omissions be discovered in the Schedule of
Errors Measurement, drawings or specifications by either party to this contract, it shall be the duty of such party to bring such omission or error to the attention of the party, and no party shall take advantage thereof.

28. The Contractor shall commence construction at the point or
Commence- points given him by the Engineer, and such work shall
ment commence on the date or dates specified by the Engineer. The work shall be carried on continuously and expeditiously after commencement and shall be completed within the time specified.

29. The Contractor shall at his or their own cost and expense, and in
Contractor strict conformity to the hereinafter contained or hereto
to furnish annexed specifications and the plan, furnish all the material
tools, etc. and labour, and all the scaffolding, tools, derricks, tackle, implements and appliances necessary or proper for the purpose, and in a good substantial and workmanlike manner, excavate for, build, construct and complete the above described works and appurtenances, together with all the work incidental thereto, of the dimensions, in the manner and under the conditions set forth in the agreement.

30. The Contractor shall, at his own expense, and without further
Barriers or other order, provide, erect and maintain all requisite
and lights barriers, fences or other proper protection, and shall provide, keep and maintain such watchman and lights as may be necessary, in order to insure safety to the public as well as those engaged about the premises or works. He shall also provide a sufficient number of "NO THOROUGHFARE" or other proper notices which he must cause to be placed and maintained in good order in conspicuous places. When any work is carried on at night, the Contractor shall supply, at his own expense, a sufficient number of electric or other approved and sufficient lights, to enable the same to be done in an efficient and satisfactory manner, and the Engineer shall have the power to order additional lights to be put on at the Contractor's expense if, in the Engineer's opinion, they are or may be required.

31. The Contractor shall provide and properly maintain in clean
Water condition, suitable and convenient privy or water-closet
closets accommodation for his men.

32. The Contractor shall employ
Employment labour residing within a mile radius of
of labour the with the approval and consent of the Principal or his duly authorized agent. The Contractor shall not interfere in any way with the labour or workmen employed in the
.....

33. "Laitance" shall mean the milky, spongy, imperfect concrete occasionally floated to the surface when working in forms.
Laitance (*The material sets imperfectly and does not bond well.*)

The Contractor shall use no hydrant until he has obtained a permit issued under and subject to the regulations of the water
Use of hydrants department.

34. The Contractor shall provide all lands for storage of plant and materials required for prosecuting the contract.
Service ground

35. Materials furnished by either party shall be provided in such quantity and at such times as may be necessary for the
Delivery of materials proper prosecution of the works.

Notwithstanding the foregoing clause non-delivery of material by the Principal shall not constitute a right of the Contractor to damages, but shall constitute a right to an extension of time for completion of contract where the Engineer, after inquiring, reports in writing that such claim is reasonable and just. The allowable extension of time shall be mentioned in said report and shall become binding upon the Contractor.

The Contractor shall pay his workmen not less than the prevailing rate of wages in force during the execution of the contract,
Wages and such workmen shall be paid at least twice per month.

36. The number of hours out of the 24-hour day which a workman shall actually work or receive compensation for shall be
Hours such as are specified by law or otherwise by custom, except for the protection of life or property or other emergency when the necessity therefor is confirmed by the Engineer.

37. The Contractor shall, throughout the progress of the work, employ at least one competent superintendent who shall
Superintendent remain constantly on the site during working hours to superintend the work, who shall be the Contractor's representative to receive and carry out orders and instructions from the Engineer.

38. The Contractor shall, through the progress of the work, employ at least one competent foreman in each of the various
Foreman trades who shall remain constantly on the site during working hours to supervise the work of that trade.

39. Should it become necessary, before the completion of the work contemplated herein, to do any other or further work on or about these works than is provided for in this contract, the
Work not provided for in contract Contractor shall not in any way interfere with or molest such other person or persons as the Principal may employ to do such work, and will suspend such part of the work herein specified, or will carry on the same in such manner as may be ordered by the Principal, to afford all reasonable facilities for doing such work; and no other
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damage or claim by the Contractor shall be allowed, except such extension of the time for the performance of this contract as the Engineer may deem reasonable.

Safety 40. The Contractor shall conform to all requirements of the Provincial, Municipal and Dominion authorities respecting the safety and convenience of his employees, and shall assume the responsibility of the Employer Liability Act as to this contract.

Sub-letting 41. The Contractor shall not sub-let or assign this contract or any other part of the work without the consent of the Principal.

Damages 42. The Contractor shall be responsible and liable for all damages or injuries to persons or property, due directly or indirectly to defects in the design or construction of the works embraced in this contract, and shall not be relieved of such responsibility except where the Contractor can show that he has applied to the Principal for revision of design and where the same is refused in writing. Delay in replying to such application shall entitle him to an extension of time where it can be shown said delay interferes with the programme of the Contractor's work.

In carrying out the works from their inception, and until the final acceptance of the same, the Contractor must be careful to cause as little injury or damage as possible to any adjacent property, public or private, or to any sidewalks, roadways, curbs, gutters, manholes, frames, covers or street gulleys, boulevards, grass plots, sodding, trees, shrubs or any other structures, works or things on or near the line, or in the vicinity of the works or elsewhere, and he must make good the same, at his own expense, in the manner directed by, and to the satisfaction of the Engineer.

Claims for labour, etc. 43. The Contractor shall pay promptly, and in cash, for all labour employed upon and for materials furnished and used in the work, and the work shall be done and managed by and at the cost of the Contractor so as not to violate any law or ordinance and so as not to damage or injure the property of any other person. If at any time before or within thirty days after the whole work herein agreed to be performed has been completed or accepted by the Principal, any person or persons claiming to have performed any labour or furnished any material towards the performance or completion of this contract shall file with the Principal any such notice of lien or claim as is described in the Act respecting Liens of Mechanics, wage earners and others and in the Act respecting Conditional Sale of Goods, vide Statutes of Ontario, then, and in every such case, the Principal shall retain anything herein contained to the contrary notwithstanding, from the money under his control, and due and to become due under this agreement, so much of such money as shall be sufficient to pay off, satisfy and discharge the amount in such notice alleged or claimed to be due to the person or persons filing such notice, together with the reasonable cost of

any action or actions brought to enforce such lien or the claim created by the filing of such notice. The moneys so retained shall be retained by the Principal until the lien or claim thereon created by the said Acts and the filing of said notice, shall be discharged pursuant to the provisions of the said Acts.

Royalties
and patents

44. Should the Contractor use or supply any patented article, or any patented process in this work he shall be responsible for all payments of royalties and other charges connected therewith, and will save harmless the Principal from or against all claims, injunctions, suits, costs, damages and expenses arising therefrom, but should any article or process be shown or called for by the plans and specifications which form part of this contract, the patent of which is in dispute and the Contractor purchase the same in the open market with the written consent of the Principal, then the royalties or other charges connected therewith shall be borne by the Principal, unless otherwise specially agreed and the Principal shall save harmless the Contractor from all claims arising therefrom.

Inspection

45. The Contractor shall permit the inspection of all materials, workmanship and plant by the Engineer at all times during the progress of the work, and shall provide the necessary facilities and assistance therefor.

Pro.
Inspector's
powers

46. Inspectors shall be on the ground during all working hours, upon the receipt of a written application from the Contractor the Engineer shall provide such additional inspection as is required in order not to hamper the work of the Contractor. Inspectors are required to see that the provisions of the specifications are faithfully adhered to, especially as regards the quality of the workmanship and materials, and shall have the power to suspend any workman for incompetency, drunkenness or negligence. An Inspector may stop the work entirely if there is not a sufficient quantity of suitable and approved material on the ground to carry it on properly or for any other good and sufficient cause. Any work done in the absence of an Inspector may be ordered to be opened up for thorough examination, and must be rebuilt or replaced as directed, and at the Contractor's sole expense. No approval by an Inspector shall be taken as, or construed into an acceptance of defective or improper work or material, which must, in every case be removed and properly replaced whenever discovered at any stage of the work. Inspectors have not the power to set out work, or give any stakes, lines gauges, levels or grades. Any orders or directions other than as herein provided for, except
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given by Inspectors shall not be binding upon the Contractor.

Defects

47. The Contractor shall, upon being so directed by the Engineer, remove, reconstruct or make good, without extra charge, any and all defective materials and workmanship.

Protecting
unfinished
work

48. All unfinished masonry of whatever description shall be properly protected from injury and from water or frost.

Maintenance

49. The Contractor shall be responsible for all defects which may develop in the work under normal use during a period of after date of the Engineer's final certificate. He shall immediately remedy such defects free of charge when the Engineer shall have given him notice so to do. He shall also be liable for all damages caused by such defects.

Account of
material
and labour

50. The Contractor shall submit a weekly statement sworn to by his superintendent or other authorized agent, of all material received upon the works. The same shall be written legibly upon a form supplied by the Principal and shown herein marked Appendix "A."

The Contractor shall submit two weeks after the date of receipt of the progress certificates a statement sworn to by himself or his authorized agent, of all material or labour paid for or upon which the Contractor has no further liability. The said statement shall bear the dates when material was ordered, date received, date upon which Contractor's liability was discharged: when only partly discharged against a bill of material a copy of the said bill of material shall be included as appendices and referred to on the statement by suitable reference; the proportion of total liability discharged shall be shown on the statement which shall be upon a form (shown in Appendix "B") supplied by the Principal for the Contractor's convenience.

51. Progress Certificates shall be issued by the Engineer during the continuance of the work, based upon the agreed percentage of the value of the work done as set out in the contract and notice to bidders.

In case of bulk sum contracts, coincident with the signing of the contract, the Contractor shall revise the Engineer's schedule of measurements and insert unit values for the various parts of the work covered by the schedule aggregating the total sum of the contract, and if required he shall submit evidence supporting his unit values. The schedule and the Contractors unit values, together with the material received on the site, shall be used as a basis for preparing progress certificates of payment.

Progress
certificates

The progress certificates or payments made thereon shall not relieve the Contractor of any of his obligations under the contract nor prejudice the rights of the Principal against the Contractor, or vice versa, nor shall they be construed as a final acceptance of the works or any portion of the works.

Amending
certificates

52. Should the Engineer consider it necessary he may by any certificate correct or modify any certificate previously issued by him except as provided in section 51.

Payments
and credits

53. No payments or credits by the Principal to the Contractor shall be made unless a certificate shall have been previously given by the Engineer.

54. Any expenses, costs and damages which are chargeable to the Contractor and which the Principal may have paid, or be liable to pay, or which may have become forfeited to him, shall be paid to the Principal by the contractor on the Engineer's certificate, or shall be deducted by a certificate of the Engineer from amounts due or to become due to the contractor.

55. If the work shall be abandoned, or if at any time the Engineer shall be of the opinion, and shall so certify in writing to the Principal that the said work or any part thereof, is unnecessarily delayed, or that the Contractor is wilfully violating any of the conditions and covenants of this contract, or executing the same in bad faith, the Principal may notify the contractor to discontinue all the work, or any part thereof, by written notice to be served upon the Contractor, either personally or by leaving said notice at his residence or with his agent in charge of the work;

and thereupon the Contractor shall discontinue the work, or such part thereof, and the Principal shall have the right to contract for the completion of the work or to place such and so many persons as he may deem advisable, by contract or otherwise, to work at and complete the work herein described, or such part thereof, and to use such materials as he may find upon the line of the work, and to procure other materials for the completion of the same, and to charge the expense of the labour and material to the Contractor; and the expenses so charged shall be deducted and paid by the Principal out of such moneys as may then be due or may at any time thereafter grow due to the Contractor under and by virtue of this agreement or any part thereof; and in case such expense shall exceed the sum which would have been payable under this contract if the same had been completed by the Contractor, he shall pay the amount of such excess to the Principal. In case such sum shall be less than the sum which would have been payable under this contract if the same had been completed by the Contractor, then the Contractor shall forfeit all claim to the remainder; and when any particular part of the work is being carried on by the Principal, by contract or otherwise, under the provisions of this clause of the contract, the Contractor shall continue the remainder of the work in conformity with the terms of this agreement and in such manner as in nowise to hinder or interfere with the person or persons or workmen employed as above provided by the Principal, by contract or otherwise, to do any part of the work, or to complete the same under the provisions of this clause of the contract.

56. Should the Contractor or any of his agents give or offer any gratuity to, or attempt to bribe, any Inspector or Agent of the the Principal shall be at liberty to take the whole or any part of the works out of the hands of the Contractor, under the same provisions as those specified in Forfeiture of Contract.

57. After satisfactory tests of the work as a whole, and after the

completion of the specified term, if any, of the operation of the work after its completion, and when the Engineer is of the opinion that the work has been completed in a satisfactory manner and the Contractor's statement or statements have been received and when the Engineer has ascertained that all claims, liens and other liabilities if any, have been satisfactorily disposed of, he shall issue to the Principal

**Final
certificates**

and to the Contractor his final certificate, setting forth his acceptance of the work and the amount remaining to be paid to the Contractor, and thereupon the contract shall be considered as having been completed and the work accepted by the Principal. Nothing contained in the final certificate, however, shall be construed as relieving the Contractor of his guarantee as set forth herein against defects in the work, and his obligations covering infringements of protected rights and claims and damages.

No final certificate will be issued until the Contractor delivers to the Principal a statement or statements in writing and, as provided for under section 50 setting out fully the amount, kind and quality of the several materials used and incorporated into the work herein required to be done; said statement or statements to be sworn to by the Contractor before a Commissioner or other Officer authorized to administer oaths. It is further agreed that the Engineer shall have a reasonable time in which to verify the accuracy of such sworn statement or statements before such final is issued.

EXCAVATION

58. The Contractor shall grub and clear the surface over the trench wherever it may be necessary and shall carefully lift, lay aside and replant young trees and shrubs in the line of work and remove from the ground all surplus material of whatever nature or kind.

**Grubbing
and
clearing**

Where the work is done in open trench, the Contractor shall remove the paving for such width as the Engineer may direct; the repaving of which will be done at the expense of the municipality.

**Width of
paving to be
removed**

but in case the Contractor removes the paving for a greater width, or in case he removes any paving on account of slides or caves, or in making excavations outside of the lines of the work without the written order of the Engineer, the Corporation may retain from any moneys due or to become due to the Contractor, the cost of permanently replacing the pavement so removed at the municipal rate set forth in the "Schedule of Measurement" herein provided.

Where the work is done in tunnel, the Contractor shall remove pavement at the location of the shafts as shown on contract drawings, together with that from such other locations as are approved of by the Engineer, and these shaft openings shall be repaved at the municipality's cost and expense, but if through any carelessness of the Contractor cave-ins occur, the municipality shall permanently repave all sunken and broken pavement resulting from such carelessness, and the cost of the extra paving shall be borne by the Contractor. The amount deducted for extra repaving shall be as shown in the municipal rates under Schedule of Measurement.

**Removing
paving
tunnel
shafts**

59. The Contractor shall properly classify the materials removed, separating them as required by the Engineer; and shall properly store, guard and preserve such as may be required for future use in back-filling, surfacing, repaving or otherwise.

Paving material removed

60. The trenches shall be six inches, unless otherwise specified, wider on each side than the greatest external width of the sewers intended to be laid in them, but in no case shall they be less than twenty-two inches wide, and the bottom of the trenches shall be excavated so as to conform to the exact size and shape of the lower $\frac{1}{3}$ of the sewer to be laid therein, as shown on the plans, or to the foundation under the sewer except when directed otherwise in writing by the Engineer.

Width of trenches

The top width of the trench shall be the minimum width that will permit the proper building of the sewer and sheeting of the trench, should the latter be necessary, and shall exceed the bottom width, where two tiers of sheeting are employed only by the thickness of the necessary check pieces and sheeting.

When necessary, on account of change in plan, the Contractor shall excavate the trench to such additional width or depth as the Engineer may direct, in writing, receiving for such extra width or depth compensation on the basis of extra work; but all slides and caves shall be at the cost of the Contractor, and he shall refill without charge any cavities so caused with suitable and satisfactory material.

61. If any sewers, drains, connections, basins, inlets or culverts, water mains, gas mains and conduits, or any other structure having to do with a public, or private service, are encountered within the lines of this work, the Contractor shall at once notify the Engineer, in writing, of the locality and circumstances, and the place shall be passed over until satisfactory arrangements are made, and the Contractors shall not be entitled to any extra compensation, either by reason of the obstruction or from delay, but shall be allowed such extension of time as the Engineer may direct. Provided the Contractor shall not be responsible for any additional costs in the performance of his contract by reason of the

Obstructions notifiable

..... shall not apply to this contract.

and sections

62. The Contractor shall take all risks and be responsible for all expense and damage attending the presence or proximity of any gas or water pipes, public or private sewers or drains, subways, conduits and all other underground structures which cross or appear in the trench or tunnel or are parallel with or adjacent to, but outside of, said trench, or tunnel.

Contractor to take risks

63. Should the location or position of any gas or water pipe, public or private sewer or drain, subway, conduit, railway or other structure be such as, in the opinion of the Engineer, to require its removal, realignment or change, such removal, realignment or change shall be without cost to the Contractor for the work of removal, realignment or change only, but such structure shall be stripped or uncovered and supported or sustained by the Contractor, at his own cost and expense, before such removal or before and after such realignment or change, as constituting part of his contract; and the Contractor shall not become entitled to claim any damage or extra compensation from or on account of the presence of such structure or on account of any delay due to removal or rearrangement of the same, but the Contractor shall be entitled to such an extension of the time for the completion of this contract as the Engineer shall decide that the work has been delayed by any delay in the removal, realignment or change of any such obstruction.

The Contractor shall, at his own cost and expense, loosen and remove all paving material and earth between the rails and over and around ties of any and all tracks requiring removal, as being part of the work called for in the stripping or uncovering of obstructions.

64. The Contractor shall not cause any hindrance to nor interfere with any individual, Municipal Department, gas, railroad or other company or companies in protecting its or their mains, pipes, poles, posts or other structures, nor in shifting, removing or replacing the same; but the Contractor shall suffer the said individual, City Department, company or companies to take all such measures as they deem wise or as may become necessary for the purposes aforesaid.

65. All iron water and gas pipes and other structural materials, excepting as otherwise specified herein, which it becomes necessary to remove, shall be considered the property of the Corporation, and left in such part or parts of the streets as the Engineer may direct, unless notice to the contrary is given in writing by the Engineer to the Contractor, in which case the same shall be removed or otherwise disposed of at the cost and expense of the Contractor.

66. In case an obstruction requires a new trench location, the Contractor will be paid for excavation made in the abandoned trench, and for any temporary repavement required, as extra work.

67. The Contractor shall protect all water and service pipes from freezing, and he failing to do so, the Waterworks Department shall be, and is hereby authorized to protect such mains and service pipes, or in the event of their having suffered injury, to immediately replace such pipes or to recaulk and repair the same, and the cost thereof shall be charged to the Contractor;

the cost so charged to the Contractor shall be deducted from any sum or sums due or that may become due the Contractor under this contract, upon written notice from the Waterworks Department that any bill rendered the Contractor for such replacement and repairing is due and unpaid.

Poles and posts 68. Poles or posts of any description coming within the line of the trench will be removed and replaced without cost to the Contractor.

Length of trench to be open at one time 69. Not more than three hundred (300) feet of trench shall be open at any one time, except where so ordered by the Engineer, and the length of trench open, beyond the finished section of the sewer, shall be subject to the approval of the Engineer. The excavation of the trench shall be fully completed at least twenty (20) feet in advance of the construction of the invert, unless otherwise ordered.

Surplus material, how disposed of 70. In case more material is excavated from the trench than can be disposed of on the street the surplus material shall be carried away to some convenient place to be provided by the Contractor and when the sewer shall be built, the material, if of the proper kind shall be brought back and the trench properly filled, the cartage and storage being at the Contractor's expense. All surplus material or any portion thereof, excavated from the trenches shall, if required, be deposited on the streets and avenues within the limits of this contract where the streets are below grade, and in such manner as to leave the surface of the same even, to the satisfaction of the

Locations where superfluous earth may be deposited 71. Superfluous earth and other material from the trenches and excavations may be deposited or at such other points as the Engineer may direct; provided that the average haul of the same shall not exceed that to the place named.

If required to be hauled a greater distance than one mile, an extra allowance of three-quarters of a cent per cubic yard per hundred feet will be made to the Contractor.

Material not to be sold without permission of the Engineer 72. The Contractor shall not sell or permit to be removed from the line of the work, before the trench shall have been refilled, any building sand or earth excavated therefrom, except upon the written permission of the Engineer and then only so much as shall remain after reserving a sufficient quantity to refill the trench and complete the paving, but he will in all cases refill the trench with the same material thrown out, provided it be good sand, gravel or earth; but if it be unsuitable, consisting of rock, blasting stones, mud or top soil, then the same shall be removed from the ground, and good clean

earth procured and used for refilling the trench, and sand of proper quality and depth spread on the surface, to receive the re-pavement.

Excavation in built-up districts 73. In built-up districts or in streets that are thoroughfares, the material excavated from the trench for the first 100 feet in length shall be carted away by the Contractor as soon as excavated, and the material subsequently excavated shall be used to fill in the trench where the sewer has been built. This is done so as to insure that there shall be no surplus material lying on the line of the street at any time during the construction of said sewer. Any extra material required for filling at the completion of the work shall be procured by the Contractor at his own cost and expense, and at all times the gutters shall be kept open for surface drainage, and the street and sidewalks shall be kept clear and free for the passage of carts, wagons, carriages and street or steam railway cars or pedestrians, unless otherwise authorized by special permission in writing from the Engineer.

Hauling material on streets 74. When it is necessary to haul soft or wet material over the streets or pavements of the city, the Contractor shall provide suitable tight wagons, approved by the Engineer so as to prevent deposits on the streets or pavements. In all cases where any materials are dropped from the wagons of the Contractor he shall clean up the same as often as directed and keep the sidewalks clean and free from dirt and mud.

Bridging trench at crosswalk and on line of work 75. Where any crosswalk is cut by the trench it shall be temporarily replaced by a timber bridge at least three feet wide, with side railings if so ordered; no allowance will be made therefor. When in the opinion of the Engineer it is necessary to construct a bridge for wagons, at street intersections or on the line of the work, the Contractor shall build and maintain the same, and no allowance will be made therefor. The work shall at all times be conducted so as to cause as little inconvenience as possible to public travel and access to private or public property on the line of the work.

Work to be done at night 76. Whenever, in the judgment of the Engineer, it may be necessary or expedient, in order to interfere as little as possible with any street or steam-railroad, and to preserve and maintain traffic over or on any tracks, or over or on any street or road, to do work at night or after or before the regular time of ending or beginning labour, such night or overtime work shall be performed by the Contractor without additional or extra cost to the Corporation beyond the price bid for the work. The Contractor shall provide such and all lights as the work may require and as the Engineer may deem necessary for the proper and expeditious carrying on of the work.

77. The Contractor shall at his own cost and expense shore up or otherwise support or protect any buildings, bridges, walls, fences, pavements or other structures which may show defects or which, in the opinion of the Engineer or the Contractor, may be liable to injury or to be endangered during the work; and in case of injury, damage or disturbance to any buildings, bridges, fences, walls or other structures during the construction of the sewer herein contracted for whether directly or indirectly by and because of the construction of said sewer or of any extra work entering into this contract, the Contractor shall at his own cost and expense proceed to restore, repair, rebuild or otherwise make good the damage, injury or other disturbance so noted, and put the said buildings, fences, walls or other structures in a condition the same as or equal to that existing previous to his beginning the work.

Contractor to protect and support buildings, fences, etc.

78. The right is reserved by the Corporation for the Engineer to direct the manner in which the excavation shall be proceeded with and adjoining structures protected in the event of encountering quicksand, subsurface streams, or similar dangerous contingencies, and section 42 shall apply.

Dangerous contingencies

79. The Contractor, in addition to the other risks of the work, shall take all risks and be responsible for the safety and integrity of all street or steam railroads encountered in his work, and for damage thereto of any kind and character, and shall take all necessary precautions to avoid injury to the roadbed or tracks of such railroads, and any unnecessary delays or interruptions to traffic.

Contractor responsible for railroads

80. In the event of the sewer lying parallel with or adjacent to, or crossing the line and track or tracks of any street railway, the Contractor shall alone be responsible for the support of said track or tracks in such manner as to continue traffic thereon in a safe and regular manner. He shall place stringers and other timbering (and piling where necessary) and do all other work necessary to sustain tracks in a proper and safe condition to the satisfaction of the Railway Company and the Corporation. The cost of said support being borne by the Contractor as a part of his work under this contract.

Street railway

In case of settlement of, or injury to, the tracks or other structures belonging to said street railway, as a consequence of the neglect or refusal of the Contractor to support said track or tracks, or because of the inadequate, insufficient or otherwise unsuccessful method or means of support employed, then the Contractor shall proceed, upon receipt of written notice from the Engineer, to realign, regrade, re-surface and repave such track or tracks and restore the same to the condition existing before beginning work, or to a similar condition; and in the event of the Contractor's neglecting or refusing to commence

making such repairs immediately after receipt of such written notice, then the Engineer may proceed to realign, regrade, resurface, repave and restore said track or tracks as above provided, and the cost thereof will be deducted from any moneys due or to become due the Contractor under the contract.

81. In the event of the sewer lying parallel with or adjacent to, or crossing the line and tracks of the Grand Trunk, Canadian **Steam railways** Pacific, Canadian Northern or other Railway Company, the said Railway Company will drive piles and place stringers and braces for the support of their tracks at the expense of the Corporation. The Contractor shall then be permitted to enter upon the right-of-way in order to perform the work necessary for the carrying out of this contract.

Should there be a settlement of, or injury to, the tracks or other structures belonging to the said steam railways, as a consequence of the neglect or refusal of the Contractor to properly sheet his trenches or otherwise support the ground through which the trench is excavated, or because of the inadequate, insufficient or otherwise unsuccessful means of support employed, then the Contractor shall proceed (upon receipt of a written notice from the Engineer) to realign, regrade, resurface and ballast such track or tracks and restore the same to the condition existing before beginning the work, or to similar condition; and in the event of the Contractor neglecting or refusing to commence making such repairs immediately after receipt of such written notice, then the Principal may proceed to restore said tracks as above provided, and the cost thereof will be deducted from any moneys due or to become due Contractor on this contract.

Presence of inspector 82. The presence of an inspector employed by any street or steam railway company shall not relieve the Contractor of responsibility.

Manner of crossing railroads 83. When any street or steam railroad lines are to be crossed or interfered with, directions as to the time and general manner of doing this work will be given by the Engineer, but the Contractor, in addition to other risks of the contract, shall be responsible for all risks and damages attending such work.

Responsibility and payment where tracks have to be removed 84. Should the required location of the sewer be under and parallel with any such railroad track as to require the temporary removal of such track or tracks during construction, such track or tracks will be removed and relaid without cost to the Contractor for the actual work of removal and replacing. The Contractor shall be responsible, however, for any damage or injury to the roadbed due to improper construction or back-filling.

Culverts and receiving basin 85. All excavations for culverts and receiving basins in earth are subject to these specifications for trenches.

86. Excavations for bellmouths and other junctions, storm or overflow chambers and other appurtenances of the sewer shall be made at the points shown on the plans. Such excavations shall be of the necessary widths and depths, and shall be made in all respects in accordance with the requirements of these specifications.

Excavations for bellmouths, etc.

87. The Contractor shall not excavate for the sewer in tunnel, except as provided in the contract drawings, without the Engineer's permission in writing, and the location of all shafts shall be subject to the approval of the Engineer. Notwithstanding anything to the contrary the Contractor shall not excavate for the sewer in tunnel unless all necessary materials are provided, and the manner of carrying on the work is satisfactory, for the proper support of the sides and roof of the tunnel and for maintaining the specified cross section throughout construction.

Tunneling

PILING, SHEETING, SHEET PILING, BRACING, SHORING, ETC.

88. The price paid per lineal foot of sewer shall include the cost of all temporary supports, sheeting and braces that may be necessary for the proper protection of the work, the adjacent streets, buildings or other improvements and to secure a safe prosecution of the work until the permanent structure is complete; such temporary supports must in all cases be removed by the said Contractor at his own expense after or concurrently with the completion of the permanent structure, except as provided for in these specifications.

89. If in the opinion of the Engineer piles are required in other places than shown on the plans or that may be mentioned in the specifications, the Contractor must drive the same when and where ordered by the Engineer. The extra piles thus ordered by the Engineer will be paid for at the municipal rate mentioned in the "Schedule of Measurement."

Piles

90. All piles shall be straight and of sound pine, cedar, spruce or tamarac at least six inches in diameter at the points and not less than ten (10) inches in diameter at the butts where cut off.

Quality and size piles

When a price per foot is bid for piles, the length driven from the required grade to the point of the pile will be paid for at the prices bid per foot. The portion of the pile cut off above the required grade will not be allowed for in the measurement, except the length cut off be less than four feet, in which case the length from the underside of the cap to the point of the pile will be paid for.

Piles, how paid for

91. The necessary length of piles to be used may be determined by driving test-piles at such points and in such manner as the Engineer may direct, and the length of such test piles in the ground will be paid for at the municipal rate in the Schedule of Measurement.

Test piles

92. Each pile shall be in one piece of sufficient length to reach to the required depth. They shall be trimmed close and all loose bark removed before driving; the small end shall be pointed and the butt end squared as directed; they shall be driven to such refusal as the Engineer may direct. All the piles shall be protected from the blows of the hammer by a wrought iron ring if necessary; should the heads of the piles be split or hammered by the driving, the portion split or broomed shall be cut off so as to utilize the full force of the blow of the hammer; any pile that may be broken in the driving or any pile that the Engineer may direct to be drawn, shall be at once drawn and a new pile driven in the place thereof.

Driving**Cutting to grade**

93. After being driven the heads of the piles shall be cut off true to the grade given by the Engineer; where it is necessary to cut off the heads of piles below water no extra compensation will be made for such cutting.

Shoring

94. The sides of the excavation shall be supported by suitable plank-ing and shoring wherever necessary. In case the distance between faces of the sheeting is less than that called for by the width of the sewer to be laid in the trench, the Engineer may direct the sheeting to be drawn or redriven, or otherwise changed and altered, without compensation to the Contractor, even though such narrow trench was not caused by negligence or other fault on the part of the Contractor, his agents or employees.

Material to be used

95. Plank used for sheeting, or sheet piling and all timber used for braces, shores and stringers or waling strips shall be of pine, spruce, hemlock or other approved timber, sound, straight, free from cracks, shakes and large or loose knots, and of the required dimensions throughout.

Where in the opinion of the Engineer the material furnished by the Contractor is not of the proper quality or sufficient size or not properly placed to insure the safety of the work or of adjacent structures or property, the Contractor shall, upon notice from the Engineer to that effect, forthwith procure, furnish and set in place or drive other and satisfactory material, or place the material in a satisfactory manner; and if he shall fail or neglect to do so, the Engineer may order all or any part of the work to be stopped until such directions are complied with and the material so placed; and the Contractor shall not be entitled to claim demand or receive any compensation for larger size or better quality or different disposition of material ordered by the Engineer nor any compensation or allowance of any kind whatsoever for or on account of any damage or delay resulting from such stoppage of work.

Failure to use shoring Contractor's risk

96. The neglect, failure or refusal of the Engineer to order the use of sheeting or sheet-piling, or of a better quality or larger sizes of timber, or to order sheeting, sheet-piling, bracing, shores, etc., to be left in place, or the giving or failing to give of any order or directions as to the manner or methods

of driving or placing sheeting, sheet-piling, bracing, shores, etc., shall not in any way or to any extent relieve the Contractor of any or all of his obligations under this contract.

Removal of shoring 97. Timbering, or sheet-piling, shall be withdrawn and removed as the trenches are being back-filled, except when, by permission of the Engineer, the Contractor is permitted to leave the same in place, at the Contractor's cost.

The sheeting and bracing shall be removed in such manner as to prevent the caving-in of the sides of the cuts. While the sheeting planks are being withdrawn the vacancies left by them shall be carefully filled by ramming with tools specially adapted to the purpose, by watering or otherwise.

All plank sheeting extending below the crown of the arch on a brick sewer must be pulled until the bottoms of the planks are as high as the crown, before a depth of more than six (6) inches of earth is placed upon the arch.

The Contractor shall cut off any sheeting or sheet-piling left in place whenever and at such points as the Engineer shall order, and shall remove from the work the portion cut off, but he shall not be entitled to any compensation for cutting off and removal.

Measure-ment 98. No payment will be made for piles sheeting, sheet-piling, braces, shores and stringers or waling-strips unless the same are left in place by written order of the Engineer and then only for the length and amount of timber actually left in the ground, except that when the length of piles sheeting or sheet-piling cut off is less than four (4) feet the Contractor will be paid for the entire length driven, the same as if it had been left in the ground.

Payment will be made for ordinary sheeting, and for all braces, shores and stringers or waling-strips, and for all sheet-piling, left in place by written order of the Engineer at the municipal rate mentioned in the Schedule of Measurement for the length and amount actually left in place, subject to the next preceding paragraph.

BOTTOM OF TRENCH AND FOUNDATIONS

99. When the nature of the ground will permit, the trench shall be trimmed for the reception of the invert, to the exact depth, form and size required, and the Contractor shall shape the bottom of the ditch approximately to fit the lowest one-third of the outside circumference of the tile, taking pains to secure an extra firm bearing near the outer edges bearing area and in no case shall the bottom of the trench be shaped to fit less than one-sixth the outside circumference of the tile. In case of any unrequired variation the space is to be refilled entirely to the satisfaction of the Engineer, and at the Contractor's expense.

For pipe sewers the bottom of the trench under each bell shall be so hollowed out as to allow the body of the pipe to have a bearing throughout on the trench bottom and conveniently permit of making the joint.

When the excavation is in hard pan or rock, the Contractor will be required, if necessary, to construct a bed of coarse sand, granular

earth or gravel, three inches in depth at the bottom of the trench to receive the pipe; and the sides of the pipe shall be protected with the same material to a thickness of three inches on each side.

100. Wherever the material at the bottom of the trench, when excavated to the depth required upon the contract plans, is found too soft or otherwise unsatisfactory for supporting the sewer or other structure, the Contractor shall excavate to the depth or depths required by the Engineer. Such excavation shall be classed as extra excavation and the Contractor shall receive compensation for the same. When in the opinion of the Engineer, the bottom of the trench has been rendered unfit for the construction of the sewer by the Contractor, he shall make the same good and to the satisfaction of the Engineer.

101. When ordered by the Engineer or required on the contract plans the Contractor shall construct a general foundation of timber or place concrete in the trench and around the sewer. This work shall be done in accordance with the contract plans or as ordered by the Engineer and shall be further done in accordance with the specifications for this class of work.

102. The Contractor shall furnish all materials, tools and labour, excavate for and construct timber platforms and place timber in other special foundations for sewers, catch basins or other structures in accordance with the contract plans or as ordered in the field by the Engineer, and as herein specified.

Cedar, white pine, hemlock or other approved timber shall be furnished; all timber shall be sound, straight, free from cracks or shakes or large loose knots and squared to the dimensions required throughout its entire length. Sills or caps when used shall be firmly bolted together and to the piles upon which they may be placed, all as required and directed or shown on the plans.

When, in the opinion of the Engineer, it is necessary to lay a timber platform for foundations, the planks used shall be of the kind and quality herein described, and cut and laid in the manner designated. They shall be firmly spiked, nailed or bolted to the sills in the manner and to the extent required by the Engineer.

103. The quantity of timber, in the platform or other foundations, shall be measured for payment on the basis of, the quantity, per thousand feet board measure (M. feet B.M.), required by the contract drawings and specifications, or as modified by orders of the Engineer. The Contractor's bid for timber in platforms, and in other special foundations, as above provided, shall include, furnishing all materials, tools and labour, completing the work, in accordance with these specifications and the contract plans, and shall include making all necessary excavation below the regular sub-grade of the sewer and doing all work incidental to, or necessary to complete, the construction of the timber platforms herein provided for.

Standard platform

104. Unless otherwise required on the contract plans, all timber platforms in foundation for vitrified clay pipe sewers shall be constructed as follows:

Sills shall be laid transversely in the trench and planking securely spiked thereto. The dimensions and the spacing of the timbers and planking to be used will be given in the field and the Contractor shall drive four-inch by four-inch (4" x 4") timbers by hand into the bottom of the excavation to a satisfactory bearing and shall spike the sills to the same. The price bid per thousand feet Board Measure (M. ft. B.M.) for timber platforms shall include furnishing and driving each hand pile.

Standard platform 2 ft. 6 in. will be built by bedding parallel longitudinal sleepers inch by inch planks into the bottom of the trench. In bedding said sleepers care must be used not to excavate material from between sleepers, nor to a greater depth than required by the grade given by the Engineer.

Said lines of sleepers shall in no case exceed a distance from each other of four (4) feet measured from centre to centre. The outer line of sleepers on either side of the sewer shall be laid with the outer edge of the plank parallel with and immediately under the outer toe of the masonry foundation to be built thereon. Said lines of sleepers shall be laid continuously throughout such length of sewer as ordered by the Engineer. Upon these lines of sleepers two-inch planks will be laid transversely in the axis of the sewer. Said planks shall not be less than eight inches nor more than sixteen inches in width and shall be laid so as to form a high flooring over the entire bottom surface of the excavation as specified, and shall be securely spiked to each sleeper with six-inch wrought iron or steel wire spikes.

The upper face of said platform or flooring as completed shall form substantially a flat surface, horizontal transversely, and shall have the same inclination longitudinally as the sewer.

When extra lumber (not shown on the plans) is ordered to be used in foundation, payment will be made for such extra amount required at the municipal rates mentioned in the Schedule of Measurement.

The Engineer reserves the right to direct the Contractor to use a different amount of timber or different width or design of foundation from that shown in the plans and payment will be made for the actual difference between the amount specified or shown and the amount corresponding to such different design. No payment will be made for a greater amount of timber than that required by the plans if the same is made necessary by any default or negligence on the part of the Contractor.

Change of foundation

105. Should, in the opinion of the Engineer, the use of a wooden invert shown on the plans, not be necessary or desirable, the Contractor shall refrain from using same at such points as said Engineer may direct.

LAYING OF VITRIFIED CLAY OR CEMENT SEWER PIPE

106. The Contractor shall at his expense furnish all the materials, tools and labour and shall construct cross frames or horses at such intervals as the Engineer may order in the field. The Contractor shall further furnish all other implements necessary to determine the proper settling of the pipes.

Pipes to be fitted dry on bank 107. All pipes, previous to their being lowered in the trench, shall be fitted together dry on the surface and matched, so that when joined in the trench they may form a true and smooth line of tubes; and in no case shall they be lowered into the trench until the same is done.

108. When the trench is properly prepared and before laying the sewer, the Contractor shall notify the Engineer who will thereupon direct an assistant (the inspector) to be present when the pipes are to be laid; and it is further expressly understood that at no other time will such laying be proceeded with.

Mortar 109. Mortar for joints shall be mixed in the proportion of one part of cement and two and one-half parts of sand.

The interior of the bell shall be wiped smooth and clean, and the hub and spigot thoroughly wet, and the annular space shall be free from dirt, stones and water.

Joints, how made, vitrified clay pipe 110. The mortar shall be laid in the collar in such manner that after the spigot end is driven into the collar the mortar will fill the annular space between the spigot and the limbs. Mortar is then to be wiped around the inside of the joint to fill any vacancies which may be left.

Special care must be taken to properly fill with mortar the annular space at the bottom and sides as well as at the top of the joints. After such space has been filled, the cement having been compacted with a wooden or iron calking tool, a neat finish shall be given to the joints by the further application of a similar mortar to the face of the hub so as to form a continuous and even bevelled surface from the exterior of said hub to the exterior of the spigot all around. All water must be kept out of the bell-hole during the laying, or else such bell-hole must be completely filled with cement mortar or with concrete (for which mortar or concrete no extra compensation will be allowed). The interior of the joint shall be wiped clean of cement by a wad made of a sack filled with hay, large enough to tightly fill the pipe and attached to a rod or cord, which shall at all times be kept in the sewer and pulled ahead past each joint as soon as cemented.

For combined sewers the annular space between the bowl and the spigot that fits into it shall be well filled all around with mortar in the usual manner, care being taken to make the entire joint perfectly watertight. Should the pipe be laid in a wet stratum, a hemp gasket reaching entirely around the pipe shall be pushed into the bell, before

the mortar is used, and thoroughly compacted with a wooden or iron calking tool, and a neat finish given to the joint by applying the mortar to the face of the bowl in such a manner as to form a continuous and even bevelled surface from the exterior of the spigot. An alternative and perhaps preferable method is to use the mortar first and complete the joint with the hemp gasket well compacted with a wooden or iron calking tool.

In laying sanitary sewers all joints shall be made with a narrow gasket of hemp or jute, and cement mortar, and special care shall be taken to secure tight joints. The gasket shall be soaked in Portland cement mortar, one of cement to one of sand (the shrinkage of cement grout makes it undesirable) and then carefully inserted between the bell and the spigot and well calked with suitable hardwood or iron calking tools. It shall be in one continuous piece for each joint and of such thickness as to bring the invert of the two pipes smooth and even. No joint shall be cemented until the gasket of the next two joints in advance are properly inserted. The remainder of the joints shall be filled with cement mortar applied by hand and a thin gasket as above inserted, well pressed into the annular space and well calked by a suitable hardwood calking tool; the joints shall then be finished by hand and levelled off from the outer edges of the bell to an angle of 45 degrees.

Joints exposed to direct sunlight shall be kept wet or suitably protected until the back filling is carried forward.

Joints for cement concrete pipe shall be made in the following manner
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.....
.....

Bowl holes to be filled 111. As soon as the cementing of any joint has been completed the bowl holes under the bowl shall be carefully and compactly filled with sand, loam or fine earth.

Interior of pipe to be kept clean 112. The interior of the pipe shall be carefully freed from all dirt, cement and superfluous material of every description as the work proceeds, for which purpose a disc mould or plate attached to a rod sufficiently long to pass two joints from the end of the pipe last laid shall be continuously worked through.

The mouth of the pipe shall be carefully protected from all blasts, and the excavation shall in all cases be fully completed at least twenty feet in advance of the laying of the pipe. In all cases the mouth of the pipe shall be provided with a board, or other stopper, carefully fitted to the pipe, to prevent all earth and other substances from washing into it. In no case shall brick or stone be used for that purpose.

**Connections
with existing
sewers**

113. When sewers laid under this contract are to be connected with existing vitrified clay sewers the connections shall be made in the following manner:—

A length of at least six feet (6') of the existing sewer shall be opened up to the surface of the ground with a width of trench equal to that specified for that size of pipe. At least two lengths of the existing sewer pipe shall be removed, the new branch or special inserted, and the connection completed by inserting a length of pipe cut to fit the closure. The pipes may be fitted together by raising the pipe in the trench a sufficient distance to permit of slipping the joints.

All branch pipe, connections and pipe of whatsoever kind shall be excavated for, fitted and laid as above described, except that house connection drains will not be laid in concrete.

Branch pipes and house connection drains when not immediately used shall be closed with an earthenware cover fitting within the bowl. The joint between the cover and the bowl shall be filled with oakum and cement mortar 1:6* and the entire surface of the earthenware cover plastered with cement mortar 1:6. The house connection drains, when required, are to be extended to a point two feet inside the curbs, or to such distance and on such grade as the Engineer shall direct.

Slants 114. The location of the slant end of each lateral or Y branch is to be at the point shown on the plan; when placed otherwise it shall be defined in such manner that it can be found

by measurement from the nearest manhole.

**Reducers
to be
used** 115. Connection with a 6-inch pipe into a 9-inch junction must be made with a reducer. Extra work of any kind required will be paid for at the municipal rate as shown in the Schedule of Measurement.

**Freezing
weather** 116. If pipe sewers and drains are laid at any time when the temperature of the air is below thirty-two (32) degrees Fahrenheit, the Contractor shall at his own cost and expense take all such precautions as the Engineer may direct, by heating the water or heating the ingredients of mortar or otherwise, to prevent injury or damage to the work, and no pipe shall be laid at any time when the temperature of the air is below 25° F., unless permission of the Engineer is first obtained in writing.

**No walking
on pipe** 117. No walking on or working over the pipe after it is laid (except as may be necessary in tamping the earth and refilling) will be allowed until there is at least 20 inches of earth over the same.

*Lean mortar to permit of removal without damage to bowl.

RE-FILLING AND FILLING

118. After the sewer with its required foundation is laid or built, the work shall be protected and the filling carefully packed and rammed under and around the sewer by trusty persons with proper tools. The

Refilling refilling of the trenches to a height of at least (2) two feet above the top of sewer shall be done in layers not exceeding six inches thick in the loose, and the earth used is not to be dumped in, but is to be placed and spread evenly with shovels at that thickness, then satisfactorily compressed by iron tampers. No retaining walls for the refilling will be allowed in the trenches over the sewers, whether for temporary use or otherwise.

119. No filling to the height specified above shall be thrown in from the top of the trench or dumped from buckets but shall be
Manner of placing materials dumped or thrown in upon a section already brought above said specified height. The trench shall then be refilled to the required height in layers, each layer not to exceed one foot in thickness. The earth or sand shall be properly rammed as directed or permitted by the Engineer as the work progresses. Care shall be taken to carry the fill up evenly on opposite sides of the sewer.

In no case shall back-filling be placed around or over vitrified clay sewer pipe until twenty-four hours have elapsed after the placing of the mortar in the joints.

120. The refilling in all cases shall be of good, clean earth, sand or gravel free from stones above eight inches in diameter, and
Kind of earth to be used not containing, in any part or place, a proportion of stones below that size not exceeding one part of stone to three parts of earth. For height of at least 1½ feet above the top of all pipe sewers the material shall be entirely free from stones.

No house ashes, putrescible refuse or other material of an unsatisfactory character shall be used in refilling, and the Contractor shall not permit the trench to be used as dumping for refuse.

The use of frozen earth in refilling shall not be allowed unless permitted by the Engineer in writing and then only to the extent expressly specified.

Deficiency of material 121. Should there be a deficiency of proper material for refilling, the Contractor will be required to furnish the same at his own cost and charge.

122. The space between the lines of excavation in tunnel and the
Backfilling in tunnel outer surface of the masonry shall be completely backfilled with selected excavated material solidly packed and thoroughly rammed and consolidated in place.

123. The filling of all shafts and around manholes
Backfilling in shafts and manholes shall be done with suitable material approved by the Engineer which must be carefully lowered and thoroughly compacted by ramming.

124. As the trenches, shafts or manholes, as the case may be, are filled in and the work progresses the Contractor shall cart away or remove all surplus earth, stone and other material from the ground, to such places on the line of the work as directed, and leave all roads, places and public or private lands free, clear and in good order and on the completion of each section of 100 feet of sewer, the regrading and repaving over the same shall be done and completed. In case this is neglected, the Contractor will be allowed only twenty-four hours to remove the surplus, or repave the trench, after a written notification of his failure or neglect, said notice to be served on the Contractor, either personally or by leaving it at his residence, or place of business or with his agent in charge of the work; when, if not done, it will be done by the municipality who may at its discretion sub-let all such uncompleted work, the same to be done entirely at the Contractor's cost and expense.

The following places
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.....
.....
have been set aside to serve as dumping grounds for surplus material under this section of the contract.

125. All bulkheads and points of beginning and ending of all curves, connections, house connections and culverts shall not be covered over nor filled around until the same shall have been located and measured by the Engineer and permission given by him to refill the trenches at such points.

TEMPORARY REPAVING

126. When the back filling of the trench is completed the Contractor shall temporarily repave or resurface the openings in the pavements in such a manner as to make the surface of the roadway accessible for foot and vehicle traffic, in a manner satisfactory to the Engineer and shall maintain the same until the permanent repaving is placed. The compensation for temporary repaving or resurfacing shall be included in the bid.

No mounding up of the material over the trench and covering the same with riffraff or loose stones will be considered as a compliance with the above requirements, but the temporary repavement shall be of a character approximating the character of the original pavement. The Contractor shall at his own cost and expense, immediately remove and replace in a satisfactory manner any and all such repavement as shall be condemned by the Engineer as being unsatisfactory; and in case the Contractor shall refuse, neglect or fail to remove and replace such unsatisfactory pavement, or to make satisfactory progress in doing so within twenty-four (24) hours after the receipt of a written notice so to do from the Engineer, then the Engineer may proceed to remove and replace such condemned repavement, and all the cost and expense thereof, including the cost of any new material that may be required, shall be charged to the Contractor, and may be retained by the Corpora-

tion out of any moneys due or to become due to the Contractor under this contract. Broken cement sidewalk material and concrete base of roadways may be used by the Contractor without charge for temporary repaving.

PERMANENT REPAVING

Corporation responsible for permanent repaving 127a. *"The permanent and final repaving of the roadway or carriage-way and the reconstruction of all permanent gutters, curbs and gullies within the limits of the trench as specified shall be done by the Corporation and will be without cost or expense to the Contractor, and said Contractor will be in no way liable or responsible for the condition of the roadway after the Corporation assumes the maintenance; except that, should any defect in said permanent pavement become manifest as a result of a broken pipe, open joint, or other defect in the sewer or any of its appurtenances or connections then the said Contractor shall be liable and responsible for all expenses and damages arising from such defects, and shall reimburse the Corporation for any and all costs and expense to which it may be put by or because of such defects or the results arising therefrom, and the Engineer shall be the sole judge in determining the extent and damage arising from such defect.*

Contractor responsible for permanent repaving 127. Six months after completion of the laying of the sewer and pavement the Contractor shall, unless otherwise specified and agreed upon, permanently repave all openings in street pavements made for the execution of work under this contract, and shall further permanently repave all pavements damaged in any manner by the work under this contract. All such repaving shall be maintained for a period of six months after the final acceptance of the work as provided in section.... of this contract. The character of the existing pavement is shown upon the contract plan and the pavement shall be repaved with the same kind of material.

Restoration of maintenance contract pavement 128. Whenever it becomes necessary for the Contractor to restore asphalt, wood-block, brick or other maintenance contract pavement, the order for such restoration shall be given to the company or individual who has a contract with the Corporation for the maintenance of that particular pavement, and should the Contractor neglect or refuse to send such order to the proper company for the restoration of so much of the pavement as shall be required by the Engineer, then the Corporation may proceed to have the work performed by said company or individual, and the expense thereof charged to any sum or sums retained by the city for and on account of this contract.

VITRIFIED CLAY SEWER PIPE

129. All standard sewer pipe and specials shall, unless otherwise specified, be of the best quality of vitrified clay salt glazed sewer pipe, of the bowl and spigot pattern, and shall be true to form and size.

130a. Vitrified clay sewer pipe shall be of the following dimensions:

Diameter.	Thickness.	Depth of Socket.	Annular Space.
6 inch.....	$\frac{5}{8}$ inch.	2 inch.	$\frac{1}{2}$ inch.
8 ".....	$\frac{3}{4}$ "	$2\frac{1}{2}$ "	$\frac{1}{2}$ "
9 ".....	$\frac{7}{8}$ "	$2\frac{1}{2}$ "	$\frac{1}{2}$ "
10 ".....	$\frac{7}{8}$ "	$2\frac{1}{2}$ "	$\frac{1}{2}$ "
12 ".....	1 "	3 "	$\frac{1}{2}$ "
15 ".....	$1\frac{1}{4}$ "	3 "	$\frac{3}{4}$ "
18 ".....	$1\frac{1}{2}$ "	3 "	$\frac{3}{4}$ "
20 ".....	$1\frac{3}{8}$ "	$3\frac{1}{2}$ "	$\frac{3}{4}$ "
24 ".....	2 "	$3\frac{1}{2}$ "	1 "
30 ".....	$2\frac{1}{2}$ "	$4\frac{1}{2}$ "	1 "

130. Vitrified clay sewer pipe shall be of the following dimensions:

D Internal Circular Diameter.	L Laying Length.	H Diameter inside of Hub.	S Depth of Hub.	B Taper of Hub.	T Minimum thickness of Shell.
in.	ft.	in.	in.		in.
6	2	$8\frac{1}{4}$	2	1 : 20	$\frac{5}{8}$
8	2, $2\frac{1}{2}$, 3	$10\frac{3}{4}$	$2\frac{1}{2}$	1 : 20	$\frac{3}{4}$
10	2, $2\frac{1}{2}$, 3	13	$2\frac{1}{2}$	1 : 20	$\frac{7}{8}$
12	2, $2\frac{1}{2}$, 3	$15\frac{1}{4}$	3	1 : 20	1
15	2, $2\frac{1}{2}$, 3	$18\frac{3}{4}$	3	1 : 20	$1\frac{1}{4}$
18	2, $2\frac{1}{2}$, 3	$22\frac{1}{4}$	3	1 : 20	$1\frac{1}{2}$
21	2, $2\frac{1}{2}$, 3	26	$3\frac{1}{2}$	1 : 20	$1\frac{3}{4}$
24	2, $2\frac{1}{2}$, 3	$29\frac{1}{2}$	$3\frac{1}{2}$	1 : 20	2
27	3	$33\frac{1}{4}$	4	1 : 20	$2\frac{1}{4}$
30	3	37	$4\frac{1}{2}$	1 : 20	$2\frac{1}{2}$
33	3	$40\frac{1}{4}$	5	1 : 20	$2\frac{5}{8}$
36	3	44	5	1 : 20	$2\frac{3}{4}$
39	3	$47\frac{1}{4}$	5	1 : 20	$2\frac{7}{8}$
42	3	51	5	1 : 20	3

NOTE: When pipes are furnished having an increase in thickness over the dimensions given in column T, then the diameter of the hub H shall be increased by an amount equal to twice the increase of thickness of shell.

131. Curved pipes, bends, slants and branches are to be equal in all essential respects to the straight pipes of the same diameter.

132. All pipes and specials shall be well vitrified, free from blisters, laminations, lime spots, and free from cracks and checks extending into the body of the tile in such a manner as to appreciably decrease the strength.

133. All pipes and specials when struck with a light hammer, shall emit a clear high pitched ring. On fracture the absorption shall not exceed five per cent.

134. Pipe designated straight shall not vary from a straight line more than one eighth inch per feet of length.

135. Curves shall be at angles of 45, 22½, 11¼ degrees, etc., as required. They shall substantially conform to the curvature specified.

136. The ends of pipe and specials shall be square with their longitudinal axis or tangent.

137. The specimens shall be sound pieces, with all edges broken, from pipes broken in the crushing or other tests. They shall be from 12 to 20 square inches in area, and shall be as nearly square as can be readily prepared. They shall be free from observable cracks, fissures, lamination or shattered edges.

Test for absorption

Preparatory to the absorption test, the specimen shall be first weighed and then dried in a drier or oven at a temperature of not less than 110 degrees C. (230 degrees F.) for not less than three hours. After removal from the drier the specimen shall be allowed to cool to a temperature of 20 to 25 degrees C. (68 to 77 degrees F.), and then reweighed.

If the specimen was comparatively dry when taken, and the second weight closely agrees with the first, it shall be considered dry. If the specimen was known to be wet when taken it shall be placed in the drier for a further drying treatment of two hours, and reweighed. If the third weight checks the second the specimen shall be considered dry. In case of any doubt, the specimen shall be redried for two hour periods, until check weights are obtained.

The balance used shall be sensitive to 0.5 g. when loaded with 1 kg., and weighings shall be read to the nearest gram. When other than metric weights are used, the same degree of accuracy shall be obtained.

The specimen after final drying, cooling and weighing, shall be placed with other similar specimens in a suitable wire receptacle, packed tightly enough to prevent jostling, covered with distilled water or rain water, raised to the boiling point and boiled for five hours, and then cooled in water to a final temperature of 10 to 15 degrees C. (50 to 59 degrees F.).

The specimen shall be allowed to drain for one minute, the superficial moisture removed by towel or blotting paper, and then placed upon the balance.

The test result shall be calculated as percentage of the initial dry weight.

138. All sewer pipes shall be subject to inspection at the factory, trench or other point of delivery by a competent inspector employed by the purchaser or consumer. The purposes of the inspection shall be to cull and reject pipes which, independent of the physical tests herein specified, fail to comply with the requirements of these specifications.

Pipe subject to inspection

Sewer pipes shall be subject to rejection on account of the following:
(a) Fracture or cracks passing through the shell or hub, except that a single crack at either end of the pipe nor exceeding two inches in
21 B.H.

length or a single fracture in the hub not exceeding three inches in width or two inches in length will not be deemed cause for rejections unless these defects exist in more than five per cent. of the entire shipment or delivery.

(b) Blisters where the glazing is broken or which exceed three inches in any diameter, or which project more than $\frac{1}{8}$ inches above the surface.

(c) Laminations which indicate large voids in the pipe material.

(d) Fire cracks or hair cracks sufficient to adversely effect the strength, durability or serviceability of the pipe.

(e) Failure to give a clear ringing sound when placed on end and dry-tapped with a light hammer.

(f) The presence of any considerable number of lime spots.

(g) The presence of any holes due to presence of vegetable matter in unburnt clay.

All rejected sewer pipes shall be plainly marked by the inspector and shall be replaced by the manufacturer or seller with pipes which meet the requirements of these specifications without additional cost to the purchaser or consumer.

MATERIALS

139. All the materials and all the work done in the carrying out of this contract must be up to the standard prescribed in these specifications, and where such material or work is not definitely described, it must be of the best of its kind, and in every case meet the requirements of the Engineer. All materials not filling these requirements must be immediately removed from the ground. Wherever an article or any class of materials is specified by a trade name or by the name of any particular patentee, manufacturer or dealer, or by reference to the catalogue of any such manufacturer or dealer, it shall be taken as intending to mean and specify the article or materials described, or any other equal thereto in quality, finish and durability, and equally as serviceable for the purposes for which it is or they are intended.

140. The Contractor shall submit samples, for the approval of the Engineer, of all material so required, and no material shall be used which is in any way inferior to the approved sample; such approval shall not be considered as any waiver of objection to the work at any subsequent period on account of unsoundness or imperfection of materials used, or on any other account provided in this agreement: and in order to afford the Engineer ample opportunity for inspection, all material shall be at the location of the work at least three days before it is used except as provided for in this agreement.

BRICKS

141. Sewer bricks shall be either wire cut shale bricks or other approved bricks, whole, new and of the best quality of uniform size with straight and parallel edges and square corners; they shall be of compact texture, burned hard and entirely through, free from injurious cracks and flaws, tough and strong, and shall have a clear ring when struck together. The sides, ends and faces of all bricks shall be plane surfaces at right angles and parallel to each other. Bricks of any make shall not vary more than one-sixteenth (1-16) of an inch in thickness, nor more than one-eighth of an inch in width or length from the following dimensions.....

The truest bricks shall be used in the face of the masonry and the exposed surfaces shall be true and smooth planes.

These bricks shall be capable of passing the following absorption test: Upon immersion in water for six hours the increase in weight must not exceed six (6) per cent.

Vitrified bricks and blocks 142. Whenever vitrified bricks shall be required in the sewer or if blocks are substituted, they shall comply with the following specification for vitrified bricks or blocks:

The bricks must not be less than or if blocks are substituted they shall not be less than , and must be even, regular and uniform in size and shape and shall not vary more than 3-16 inch in size, and they shall be nearly as possible alike in colour and appearance throughout. The sides and ends must be at right angles to one another, and must be straight and even. The bricks and blocks throughout must be free from cracks, checks or any imperfections which, in the opinion of the Engineer, may unfit them for use in the work; they must also be hard, tough, uniform in texture and thoroughly annealed throughout.

The bricks and blocks must be capable of standing the following tests:

Absorption test A piece broken from the centre of any brick or block not more than 3/4 inch in thickness and from 60 to 120 grammes in weight, is to be thoroughly dried and then immersed in water; after being in water for six hours, the increase in weight of any brick or block must not exceed two and one-half per cent.

Abrasion test Any vitrified bricks must not lose more than 22 per cent. of their weight after 1,000 nor more than 34 per cent. after 2,000 revolutions when tumbled in an iron rattler, revolving at the rate of 26 to 30 revolutions per minute, which rattler contains 100 cast iron cubes (with corners rounded to about 1/4-inch radius) weighing two pounds each, and 10 cast iron bars 2 in. x 2 in. x 8 in. (with corners rounded to about 1/4-inch radius) weighing about 8 pounds each. The rattler shall be 24 inches in diameter by 36 inches in length, with four iron bolts, each 3/4-inch in diameter, projecting 1 1/2 inches on the inside surface of the rattler. These bolts are to be placed in the two opposite staves (two in each) staggered in such a manner as to prevent the cubes from sliding instead of tumbling.

Any five vitrified blocks must not loose more than 16 per cent. of their weight after 1,000 revolutions nor more than 22 per cent. of their weight after 2,000 revolutions, when tested in the same manner as just prescribed for vitrified brick.

Samples to be submitted 143. The Contractor shall furnish the Engineer with at least seven (7) samples of the brick which he proposes to use on the work, at least one (1) week before the delivery of any bricks on the ground. These samples shall be subjected to such tests as the Engineer shall determine, at least one (1) brick being retained in the office of the Engineer.

Tests 144. The tests shall be made of samples of brick selected at random from time to time from the Contractor's supply in cars or on the works. Should the samples thus tested fail to come up to the standard prescribed herein, the whole lot may, at the discretion of the Engineer, be condemned.

Culls 145. All bricks delivered for use shall be culled by the Contractor when required. No bricks thrown out in the culling shall be used in any work done under any contract for sewers, except that the best of the culls may be used in manholes, above the level of the top of the sewer, if permitted by the Engineer.

All broken bricks or bats not required in the work must be immediately carted off the ground at the expense of the Contractor.

CEMENT

Quality and packing 145a. All cement used in the work shall be of some known and approved brand of Portland cement. It shall be packed in strong canvas sacks or barrels of uniform size.

Storage 146. The Contractor shall store his cement in a tight building, on a dry floor placed above the surface of the ground and shall notify the Engineer of each delivery of cement.

Cement shall be kept in stock sufficient for four weeks' use. Each carload lot shall be kept separate.

After each lot has been tested in the manner prescribed and proven satisfactory a certificate of acceptance of such lot will be given the Contractor, who may then, and not until then, remove the cement thus released to be used in the work, and the Contractor shall use no cement in the construction of the work other than that which has been so released.

Tests 147. All cement shall be tested by Messrs. of in the manner adopted by and shall pass the test specified by the Canadian Society of Civil Engineers with such revisions as may be made from time to time. In event of any disagreement as to quality of cement it is hereby agreed that the result of a second and third test by made in the manner prescribed shall be final and conclusive.

**Cement to
be protected
from the
weather**

148. When cement is delivered on the work it must be protected at once from the weather and kept dry, and in no case will it be allowed to be placed upon the ground without blocking under the barrels.

**Cement may
be rejected
after ac-
ceptance**

149. The Engineer may, at any time, suspend or prohibit the use of any brand of cement that develops objectionable qualities after the acceptance thereof.

SAND**Quality and
grade**

150. All sand shall be live, clean, sharp, coarse, natural or crushed silicious material, substantially free from loam or other foreign matter.

151. Sand used for concrete shall be uniformly graded from coarse to fine, no particles being more than one-eighth ($\frac{1}{8}$) of an inch in diameter and containing not more than ten (10) per cent. very fine. If used for reinforced concrete it shall not contain more than one (1) per cent. clay, and if used for plain concrete it shall not contain more than 4 per cent. clay on analyses. The material must be screened or washed whenever, in the judgment of the Engineer, this becomes necessary to meet these requirements.

152. Sand used for mortar for brickwork shall be of suitable size and quality.

BALLAST**Quality and
size**

153. Ballast for "Classes A, B, C, D, and F" concrete shall consist of clean broken stone of granite diorite, igneous trap sandstone or limestone of approved hardness and toughness, shall be free from all impurities and dust and be uniformly graded from one-eighth ($\frac{1}{8}$) inch diameter up to the maximum size specified for the different classes of concrete.

154. Ballast for "Class A," "Class D" and "Class F," concrete, shall be of such size that no particle shall exceed one (1) inch in its greatest diameter.

155. Ballast for "Class B" and "Class C" shall be of such sizes that no particle shall exceed two (2) inches in its greatest diameter.

156. Ballast for "Class E" concrete shall be of such sizes that no particle shall exceed three-eighths of an inch in its greatest diameter: "Class E" concrete is shown as facing mixture on the plans.

157. Screened gravel approved by the Engineer may be substituted for crushed stone as specified in Class B, C, and F ballast.

158. The total amount of clay in the sand and ballast together shall not exceed that specified for sand alone. The Engineer shall reject all material not complying with these requirements and the same shall be removed within 48 hours from the work at the Contractor's sole cost.

CEMENT MORTAR

159. All cement mortar is to be composed of one part approved cement and two and one-half parts sand. It is to be carefully and thoroughly mixed dry, until the entire mixture of cement and sand is of one uniform colour; then a sufficient quantity of water is to be added to make it of good consistency.

160. The mortar is to be mixed in no greater quantity than is required for the work in hand. Any excess that may be left over at night, or that may have been standing long enough to set, is not to be re-tempered, nor used in any way except for backfilling trenches.

Measure to be approved by the Engineer 161. Both cement and sand are to be, in all cases, measured in the proportions above required; cement shall be measured as in the original package, the sand shall be measured loose.

All mortar must be mixed in a proper box, made for the purpose and in no case upon the pavement or ground. (See instructions for concrete masonry.)

162. When necessary, in the opinion of the Engineer, cement alone, without any admixture of sand, will be used.

WATER

163. All water used in the construction, whether for moistening the brick or for making mortar and concrete and keeping the same wet, must be ordinary clean water. Water contaminated with sewage, oily water or water containing dirt, clay, lime, filth, or vegetable matter must not be used.

MIXING AND PLACING CONCRETE MASONRY

Location 164. The Contractor shall furnish and place all concrete structures shown on the drawings, or specified herein, and shall build any additional structures, and shall place any other concrete which may be found necessary to complete the work.

Joints 165. Joints between different sections of concrete masonry shall be made in such a manner and by such methods as the Engineer shall direct, and the location of such joints shall be subject to his approval.

Bonding 166. The Contractor shall make provision for bonding between sections of concrete masonry laid at different times, in a manner satisfactory to the Engineer.

167. Concrete cradles for pipe shall be put in place as directed in one operation up to the correct subgrade for laying the pipe, which shall then be laid thereon before the concrete has set and the remainder of the concrete cradle shall then be immediately put in place.

All pipes are to be laid true in line and grade throughout, according to the lines and grades furnished from time to time. The ends of the pipes shall abut against each other in such manner that after the sewer is completed there shall be no shoulder or unevenness of any kind along the bottom half of the sewer on the inside and each pipe shall be laid on an even, firm bed so that no uneven strain will come on any pipe and particular care shall be exercised to prevent bowl and spigot pipes bearing on the sockets.

168. Concrete, except where otherwise expressly ordered, shall be composed of a mixture of cement, sand, and ballast mixed with a sufficient quantity of water, and the ingredients shall be usually mixed in the following proportions by volume:

	Cement.	Sand.	Ballast.
Class A.....	1	2	4
Class B.....	1	3	5
Class C.....	1	3	7
Class D.....	1	4	9
Class E (Facing Mixture)	1	1	3
Class F.....	1	3	7

169. The foundations shall be trimmed as accurately as practicable and shall be at least as large as the dimensions on the approved drawings. Form work shall be erected wherever foreign material can become mixed and interfere with the concrete or mortar while the same is being deposited.

The bearing stratum shall be cleaned of all foreign material. It shall also be free from water if practicable. Under no circumstances shall mortar or concrete be deposited in running water.

One sack of cement containing 94 pounds net shall be taken as equivalent to one cubic foot of cement. All sand, crushed stone and gravel shall be measured by loose volume.

The necessary amount of water to produce the required consistency of mortar or concrete shall be determined from time to time, taking into account the atmospheric conditions and the variations of moisture in the sand, crushed stone or gravel before mixing.

All of the materials shall be systematically measured throughout the whole of the work, and the required proportions shall be accurately maintained.

170. All mortar and concrete shall be made in batch mixers unless it is impracticable to do so, in which case it shall be mixed by hand.

Mixing by hand shall be done on a smooth water-tight platform. The sand and cement shall first be mixed dry until the whole mass is

homogeneous and of perfectly even colour throughout. Sufficient water shall then be added to make flowing mortar. In the process of making the mortar the materials shall be turned over at least five times. If concrete is to be made, wetted crushed stone or gravel shall be placed on platform, then sand, and finally cement, and the mass turned over at least four times or until it has become homogeneous and of even colour and consistency.

Mixing by machine shall produce a homogeneous mass of concrete perfectly uniform in colour and even in consistency, the whole mass being kept in continuous motion within the machine for a period of not less than one minute, and the entire batch shall be discharged before placing further materials in the machine.

The re-mixing or re-tempering of mortar or concrete which has partly set shall not be permitted.

The general consistency of the mortar or concrete shall be such that the mass will flow readily in the forms, and that it can be conveyed from the mixer to the forms without separation of the ingredients.

The temperature of the mixture on completion of the mixing shall not be less than 40 degrees F. The water, sand and crushed stone shall be heated, if necessary, to obtain the result. In no case shall crystals of ice either in the sand or in the crushed stone be permitted to reach the mixing platform or the mixing machine.

Preparation of surface to receive concrete 171. The surface on which concrete is to be deposited shall be specially cleaned for the purpose. If the surface be rock it shall be given a coat of grout composed of equal parts of cement and sand well brushed into the surface and all the crevices. If the surface, vertical or otherwise, be of concrete which has not set hard it shall be spalled or roughened and afterwards thoroughly brushed over with grout composed of equal parts of cement and sand. If the surface be of concrete which has not set hard the spalling or roughening may be omitted; but grout composed of equal parts of cement and sand shall be applied as specified above.

In all cases laitance which may have formed on the surface of deposited concrete shall be carefully and entirely removed.

Concrete to be conveyed in water-tight receptacles 172. Concrete shall be conveyed in water-tight carriers and be deposited in such a manner that the ingredients will not be separated, and the mass shall be consolidated by being worked after placing. The coarser ingredients shall be removed from contact with the form work by the manipulation of a special tool.

Concrete to be deposited, etc. 173. Concrete shall be deposited in approximately horizontal masses, and the work shall be stopped only at regular or temporary vertical bulkheads.

During freezing weather concrete shall be taken from the mixer and be deposited in the forms so that no part of it shall be frozen, and the temperature of the mass when deposited shall not be less than 40 degrees F. The concrete shall be prevented from freezing until setting has taken place and until the process of hardening has begun.

Concrete must be placed in the forms within ten minutes of the time the water is added.

The depositing of concrete at expansion joints shall be done with the same care and attention as that required to ensure a smooth finish to exposed surfaces.

When concrete is to be deposited under water the site shall be cleaned from all foreign matter and all currents of water shall be eliminated. The concrete shall be deposited immediately after mixing in such a way as to displace the water and at the same time to obviate the separation of the ingredients. The work shall be carried on in such a manner as to prevent the formation of laitance between successive masses of concrete.

174. Trowelled floated horizontal surfaces shall not be less than one
Surfaces inch in thickness. They shall be composed of mortar or concrete proportioned according to the requirements for wear. The mortar shall contain at least one part of cement to two and one-half parts of sand. The concrete shall contain at least one part of cement to one part of sand and three parts finely crushed rock or gravel.

If possible the surfacing shall be applied immediately after the placing of the mass concrete, but, when this is impracticable the mass concrete shall be thoroughly washed and treated with a coat of grout composed of equal parts of cement and sand thoroughly brushed in before the surfacing is applied. In trowelling or floating the surface pure cement shall not be used.

175. Tests shall be made of concrete and mortar as the work pro-
Field tests gresses to check the density of the mixtures and the rate of
of concrete settling. The test pieces shall be cubes, rectangular prisms or cylinders having a volume of about one cubic foot. They shall be poured from the regular run of the mortar or concrete as deposited, and be left to set under the same conditions as the material in the structure. There shall be two such test pieces made from each day's work. The test pieces shall be carefully examined before the form work is removed.

176. There shall be constant competent inspection throughout the
Inspection whole of the work. The Contractor shall notify the Engineer in charge of the work at what times and at what places concrete is to be mixed and placed; and no such work shall be done except in the presence of the Inspector.

177. Concrete shall be protected from the direct rays of the sun for
Curing at least three days after being deposited, when the maximum temperature in the shade is above 60 degrees F. in the sun.

For a period of seven days after being deposited concrete shall be kept moistened when the maximum temperature in the shade is above 60 degrees F.

Removal of forms 178. The forms shall not be removed from concrete work until the concrete is safely self-supporting, and where additional concrete is to be added, until it has sufficient strength to safely sustain the superimposed load.

Defective work 179. Should any voids or other defects be discovered in any part of the work when the forms are taken down, or at any other time, the defective work shall be removed and space refilled with suitable material in a proper manner, at the expense of the Contractor.

CONCRETE AND BRICK SEWERS

Inspection 180. When the trench is properly prepared, the foundation shall be laid, and the building of the sewer shall proceed under the supervision of a duly authorized Inspector, and at no other time shall such construction work be done. Unless otherwise ordered or permitted by the Engineer not less than fifteen feet (15') of foundation shall be built at any time in any one length of trench or tunnel.

Forms and centres 181. The Contractor shall provide all forms and centres for shaping the concrete. Forms shall be water-tight, true to required lines and grades and of the required shapes and sizes. They shall be so strongly built as to withstand the ramming of the concrete, and all operations incidental to placing the concrete without being deformed or displaced. The faces of all forms against which the concrete is to be placed shall be smooth, clean and uniform and smeared with soap, oil, or other suitable substances, to prevent the adhesion of the concrete. For the construction of concrete sewers the contractor may use either wooden or steel forms. If wooden forms are used they shall be made with finished surfaces so as to give a smooth surface to the inside of the sewer. All parts of the forms shall be so made as to give a continuous surface on the inside of the sewer without projections or other irregularities. Form work shall be so fastened together that it may be removed without injury to any part of the permanent structure.

The use of small rods to hold the forms will be allowed, provided the proper means be used to take out a portion of each of the rods nearest the surface, to a depth of at least two (2) inches. All holes left after the removal of the rods shall be immediately and completely filled with cement mortar and the surfaces left true and in good condition.

Forms and centres used more than once shall be subject to all the requirements specified. If re-used they shall be thoroughly cleaned and all particles of cement or other foreign matter adhering to the surfaces exposed to the concrete removed to the satisfaction of the Engineer. The use of forms that have become distorted or are otherwise considered unsatisfactory by the Engineer shall not be permitted, and if condemned by him shall be immediately removed from the work.

Forms not conforming to the specifications shall not be used and when rejected shall be immediately removed from the work.

Removal of forms or centres 182. No forms or centres shall be removed or struck without the expressed consent of the Engineer, and the removal of the forms shall be done with great care so as to avoid injury to the concrete. No forms or centres used for the construction of concrete sewers shall be struck or removed until the back-filling has been carried to a height of at least two (2) feet above the top of the arch ring except as may be expressly ordered by the Engineer. Centres shall not be struck until the concrete has sufficiently set and in no case shall they be struck until forty-eight hours have elapsed after the completion of the concreting.

In case the Contractor shall slacken any centre before the end of the above named period or contrary to the orders of the Engineer or inspector, then the masonry shall be condemned, even though there is no apparent defect.

Section of sewer 183. The sewer shall conform accurately in its sections to the plans furnished by the Engineer. All inverts and bottoms of sewers are to be shaped from the profiles or templates properly spaced and accurately set to guide the work. The profiles shall not be more than 15 (fifteen) feet apart.

All the allowance must be made by the Contractor for the shrinkage or compression of the concrete and brick masonry in order to secure the specified size and form of the sewer.

Curves 184. All curves shall be true arcs, the profiles or inverts being properly arranged and the centres being constructed so as to conform accurately to the radii of the curves.

Bricks to be wet before laying 185. The bricks are to be thoroughly wet immediately before laying. Every brick is required to be laid in a full joint with mortar made as previously described in these specifications, on its beds, ends and sides, at one operation. In no case is mortar to be slushed or grouted in afterwards. The bricks are to be neatly and truly laid, every course by line, and the joints to be carefully struck on the inside. The bonds in all cases to be formed with a row of headers every sixth course, except in arches and inverts.

The courses of the brickwork are to be kept perfectly straight in the direction of the sewer and parallel to its flow-line.

Especial care shall be taken to make the face of the brickwork smooth.

All unfinished brickwork shall be racked back in courses and in no case will it be allowed to be toothed unless by permission in writing from the Engineer. Before any new work is joined thereto, the bricks must be scraped thoroughly clean, scrubbed with a stiff brush if necessary, and well wetted.

Inverts 186. Where the invert of the sewer is shown to be built entirely in brickwork each ring of brickwork shall be laid separately for not less than four courses in advance of the ring above. In all cases the top face of the lowest ring shall be plastered with cement mortar one-half inch thick before laying the superimposed course of

brick. When the upper course is being laid additional cement mortar shall, if necessary, be used to bed each brick in the regular manner.

187. Immediately after laying the brickwork, the whole outer surface of the arch, above the springing line, shall be plastered to a thickness of one inch with Portland cement mortar, mixed in proportion of one part cement and two and one-half parts sand. The top of the plaster shall be neatly trowelled to a smooth surface.

Where sewer is built wholly in tunnel the plastering on the outside of the arch shall be omitted.

The inner surface of the arch shall be carefully scraped, the brickwork thoroughly cleaned, and any defective joints filled in with cement mortar. Immediately after the centres are withdrawn any defects shall be immediately corrected.

188. All bricks shall be laid so that the joints appearing on the interior face of the sewer shall not in any case exceed one-quarter of an inch in width. All joints in the invert shall be carefully struck while fresh and in any case not later than three days after the arch has been covered, and such as are imperfectly filled or otherwise unsatisfactory in workmanship or appearance shall be filled with cement mortar or shall be raked out to a depth of one inch and pointed, as the work progresses, if required by the Engineer.

189. Intersections or lateral sewers, whether of brick or pipe, and all junctions for catch basin drains shall be built into the sewers at such places as are shown on plans. Six (6) inch junctions for house drains shall be built into the sewers in a thorough and workmanlike manner, commencing ten (10) feet from street corners and to be placed thence feet apart through the blocks, or as otherwise shown on the plans. A six (6) inch junction shall be built opposite each fire hydrant, and water pipe valve. The pipe junctions shall have socket ends and, where required by the Engineer, shall be carefully closed by cementing a tile disc or stopper in the socket.

In brick sewers all junctions shall be slants with one end cut at an angle of approximately forty-five (45) degrees with the axis of the slant and the other formed into a socket.

The length of the short side of the slant, not including the socket, shall be not less than

- 6 inches for one (1) ring of brick masonry.
- 12 inches for two (2) rings of brick masonry.
- 18 inches for three (3) rings of brick masonry.
- 24 inches for four (4) rings of brick masonry.

190. The dish or central portion for a width of eighteen (18) inches on either side of the centre line shall be built in place concentric with and to within a distance of (4½) four and one-half inches of the finished surface of the invert. The form for the balance of the concrete shall be supported on the dish.

On the backing thus prepared the ($4\frac{1}{2}$) four and one-half inch ring of specified brick lining shall be laid in Portland cement mortar.

Inverts shall be grouted in and allowed to set at least twenty-four hours before the arch is turned.

REINFORCED CONCRETE

191. Reinforced concrete shall be placed at such points as shown on plans and elsewhere as may be required.

The concrete used shall be "Class A" concrete as herein specified, unless otherwise directed. It shall be laid with special care to insure the proper embedding and surrounding of the reinforcing material.

In no case shall any reinforcing material be placed so as to be less than one (1) inch from any surface.

All the requirements of the preceeding sections shall apply to reinforced concrete as far as consistent.

192. All reinforcing material shall be open-hearth steel corresponding in quality to the requirements of the Manufacturer's **Reinforcing steel** Standard Specifications for Medium Steel and shall be subject to such tests and inspection as the Engineer may direct. Contractor shall supply test pieces to the Engineer whenever required without charge. Test pieces for rods shall be 16 inches long.

All material shall be free from slag, scale, or other injurious matter, and shall be stored and handled in such manner as to protect it from injury. Reinforcing material shall be so supported during construction as to insure that it will occupy its designed position in the completed structure.

Reinforcements shall be lapped at points of meeting for such a distance (not less than 8 inches or more than 18 inches) as the Engineer may determine, and shall be bound or fastened together with number 14 gauge wire in an approved manner.

No material shall be permitted to adhere to the surface of the steel reinforcing until the concrete in which it is to be embedded is being deposited.

193. Immediately before depositing the concrete the form work shall be entirely cleaned of all foreign material, preferably by **Cleaning of form work** the use of a pressure hose and nozzle discharging water, steam or air.

194. The concrete shall be deposited in small quantities, preferably as a uniform stream. It shall be manipulated in such a manner as to insure perfect adhesion to the entire surface of the steel reinforcing and to remove impounded water or **Depositing of concrete** air.

The concrete for slabs shall be deposited continuously with the beams. Special care shall be exercised to procure perfect homogeneity of tee-beam construction.

alternation of headers and stretchers throughout, so that at least one-third of the stone shall extend through the wall, when it does not exceed four feet in thickness. The top of the masonry shall not be plastered unless so ordered.

Coping stone 202. Where coping stones are necessary, they must be furnished of a good quality of bluestone or granite. They are to be cut to the shape and dimensions given, and dressed in the manner and according to the pattern required.

Foundation stone 203. When required, foundation stones are to be furnished and laid. They must be sound and of good quality, and of such general dimensions as may be required.

Mason's work after 15th of November 204. All mason work, whether brick or stone, and all concrete laid between the fifteenth day of November and the first day of April, shall be laid in mortar which has been protected against freezing either by heating the ingredients above 40° F. or protected by other equally satisfactory measures.

205. All masonry shall be covered and protected from frost in such manner as may be directed.

206. No dressing or tooling is to be done upon any stone after it is in place except by written permission of the Engineer.

Dry wall 207. Where dry wall is necessary it must be well and truly laid, and by line. Every stone must have a fair and even bearing, the courses well bonded, and all joints and crevices thoroughly pinned and wedged.

UNDERDRAINS

Position, etc., of underdrains 208. A drain shall be laid beneath the sewer only wherever the Engineer may deem it necessary. Such underdrains shall be of the size, in the location and laid to lines and grades as ordered.

It may consist either of double strength land tile or of vitrified clay pipe as called for on plans by the Engineer, and shall, whenever possible, be placed in the middle of the trench and at such depth below the grade of the sewer as will insure the work being absolutely dry during construction.

Laying underdrains 209. Both vitrified pipe and land tile shall be laid in the following manner: A trench of approximately six inches (6") greater width than the outside diameter of underdrain shall be excavated to such a depth as will permit the laying of the underdrain at the depth and grade shown on plans or as given by the Engineer. On the bottom of this trench a plank one inch or more in thickness and six inches wide shall be placed, if so directed, on which the tile shall be laid.

210. Every joint in the underdrain shall be clean and free from earth, dirt or solid matter. It shall then be wrapped with one layer of burlap, or two (2) of cheesecloth, soaked in pine tar in such a manner as to retain its porosity, in a strip at least six inches wide, which shall project at least two and one-half inches beyond the joint on each side. Pipe or tile shall not be brought into close contact, but a space of at least one-half inch shall be left between the ends of tiles and between end of spigot and shoulder of bell of vitrified pipes.

**Making
joints**

211. After the joints are made up and inspected, the underdrains shall be surrounded with selected and approved screened gravel or broken stone, carefully deposited and placed, and consolidated in a manner approved by the Engineer.

**Filling
around
underdrains**

212. During the process of laying the underdrains and constructing the sewer, in case there is an appreciable amount of suspended matter in the water flowing in the trench or the underdrain, or in case the Engineer should deem it desirable ropes, chains or other means as may be approved for preventing clogging, filling or stopping shall be installed by the Contractor. Such means of keeping the underdrains clean and open must be regularly operated in order to keep them effective, and prevent them becoming fast and useless. The open ends of underdrains shall be kept closed with a stopper or strainer of burlap or other approved material.

**Keeping
underdrains
clear**

213. Payment for underdrains shall be per lineal foot measured in the slope and the municipal rate per lineal foot shall include furnishing all labour, tools and materials, making the necessary excavation, placing the pipe, and doing all work incidental thereto.

Payment

MANHOLES

214. Manholes shall be built at such points on the line of the sewer and of such form, thickness and materials as shown on the plans or as the Engineer may direct. The masonry shall be carried up to within six (6) inches of the existing surface of the established grade of the street at that point or to such a height as the Engineer may direct. The work shall be true to line.

**Positions and
construction
of manholes**

Where manholes are not built up to the established grade of the street, they shall be covered where necessary, by special hammer-wrought bluestone or reinforced concrete slabs six (6) inches in thickness, to support the manhole heads. Joints of brickwork shall be neatly struck and pointed on the inside.

The details and dimensions of standard manholes of the various classes are given in the Standards for Sewer Construction Sheets Nos. and, and on the contract plans and all standard manholes shall conform thereto. Where the depth from the top of the manhole casting to the invert of the lowest sewer entering the manhole exceeds

twenty-four feet six inches (24' 6") the manhole shall be considered a special manhole.

Special manholes shall be constructed in accordance with the requirements and details shown upon the contract plans.

Foundation of manholes 215. The foundation of manholes for pipe sewers shall be of cement or concrete, commencing not less than six inches below the line of the inner bottom of the sewer at that point. Sewer pipes are to be built in and trimmed, when necessary, so as to be flush with the inner face of the manhole, and an arch turned over the same on a dry sand joint.

Ladders and steps 216. The Corporation shall furnish and the Contractor shall set the galvanized wrought-iron ladders and manhole steps in all manholes unless otherwise stated on plan or plans.

Manhole frames and covers 217. A cast iron manhole frame and perforated cover will be furnished by the Corporation to the Contractor, who shall fit and place the same at his own expense on manholes built to receive them. The heads shall be placed on full beds of mortar and as shown on the plans.

Weight 218. The heads of street manholes shall weigh not less than four hundred and seventy-five pounds; the cover shall weigh not less than one hundred and thirty-five pounds. For sidewalk manholes the heads shall weigh not less than three hundred pounds, and the covers shall weigh not less than one hundred pounds. Where there is no pavement, the holes in the manhole covers shall be neatly fitted by the Contractor with white pine plugs tightly driven and cut off flush with the upper and under surface thereof.

Plastering outside 219. The outside of all brick manhole shafts shall be plastered throughout with mortar one-half inch thick, consisting of one part cement and two and one-half parts sand.

Brick and concrete masonry 220. The brick masonry in the manholes shall be built with ordinary sewer brick and the construction of the brick masonry and the materials therefor shall correspond to the requirements specified under Brick Masonry. All concrete masonry shall be furnished and placed in accordance with the requirements specified under Concrete Masonry.

Special foundations 221. When ordered by the Engineer in writing the contractor shall construct special foundations of concrete masonry under the manholes. The excavation for this work shall be paid for under Extra Excavation and the Concrete shall be paid for under Extra Concrete.

222. The above described manholes, whether in brick or pipe sewers, are to be in all cases fully and completely built to a point two feet above the arch of the sewer as the work progresses, and as each is reached; and the sewers will not be allowed to be laid down beyond or in advance of any manhole not so completed except by special permission.

**Sewer not
to be built
in advance
of manhole**

CATCH BASINS

223. Catch basins, gulleys or receiving basins are to be constructed in all respects complete according to the Standard for Sewer Construction sheets No. to, and as called for on the plan. They are to be constructed of concrete or of 9-inch brickwork, laid in Portland cement mortar. They are to be provided with gratings securely fitted on the street opening, and with patent cast iron flap-traps, such gratings and traps being supplied by the Corporation and fitted by the Contractor. The castings shall be placed in full beds of mortar and as shown on the plan. A bent pipe 9-inch to 12-inch in diameter, as may be called for on the plan or ordered by the Engineer, is to be built in and connected with the sewer, in course of construction, by pipes laid and jointed as may be directed.

**Catch
basins,
gulleys,
how con-
structed**

224. The excavation for basins shall be of such dimensions as to give not less than one foot in the clear, inside of any shoring or bracing which may be needed. In case the nature of the ground be such as to render it necessary, such additional foundation as may be directed shall be built and will be paid for at the municipal rate for the various items entering into the construction thereof.

**Excavation
for basins**

225. Brick masonry in the catch basins shall be built with ordinary sewer brick, and the construction of the brick masonry and the materials therefor shall correspond to the requirements specified under brick masonry.

**Brick and
concrete
masonry**

All concrete masonry shall be furnished in accordance with the requirements specified under Concrete Masonry.

The joints of brickwork shall be neatly struck and pointed on the inside.

The outside of all brick catch basins shall be plastered throughout with mortar one-half inch thick consisting of one part cement and two and one-half parts sand.

226. The Contractor shall restore and readjust, if necessary, sidewalk, curb and gutter stones around the basins with the kind now in place and of equal workmanship; concrete sidewalks to be replaced in whole squares, and flags of the proper quality not less than 5 feet by 4 feet, to be cut to accurately fit the corners of the basin-heads.

**Sidewalks,
curbs, etc.,
around basins**

Temporary inlets to basins 227. In case the street and sidewalk should not be graded to the established grade at the point where receiving basin and manhole are built, such temporary arrangement shall be made for the inlet as may be ordered.

FLUSH TANKS

How built 228. Flush tanks shall be constructed of the dimensions and in such places as are shown on the plan; they shall be provided with siphons of the size shown and of an approved pattern. When not otherwise ordered they shall be built of concrete thoroughly plastered on the inside with neat cement, so as to be completely water-tight. They shall be covered with manhole heads of regulation weight and pattern, and when the street is not paved the Engineer **Pave around head** may order that for three feet around such heads the streets shall be paved with granite blocks on a proper foundation of clean, sharp sand.

Connect flush tanks to sewer and main 229. The Contractor shall connect the flush tanks with the sewer and also with the water mains, unless otherwise ordered; the whole to be in perfect working order before acceptance. The connection with the water main to be made under a permit to be obtained by the Contractor from the Water-works Department and under its rules and inspection.

IRON WORK

Quality 230. All cast iron to be of the best quality, hard and tough, and of such strength that a bar two inches deep and one inch in width placed in supports two and a half feet apart will bear a weight of 3,000 pounds in the centre without breaking. Specimen bars for testing are to be made at each casting if required, at the Contractor's expense and shall become the property of the Engineer for the purpose of this contract.

All castings are to be perfectly solid, to have smooth, clean surface, and be free from lumps, flaws, holes or defects of any kind. They are to be accurately shaped according to drawings, and any piece which is less than the required thickness at any point shall be rejected.

No filling or plugging of any kind whatever will be allowed, and any casting found so treated will be rejected, and must forthwith be rejected at the Contractor's own expense.

Coating 231. All castings after being cleaned and inspected are to be heated to a temperature of 125 degrees Fahrenheit and thoroughly coated with Dr. Angus Smith's patent composition, properly prepared with pitch and linseed oil, and at a temperature of 300 degrees Fahrenheit; or with some other approved iron paint; until this is done all castings are to be kept under cover and perfectly free from rust. Care is to be taken that all parts are well coated with a tough, durable covering. No casting shall be coated until it has been inspected by the Engineer or his authorized agent.

232. Patterns for cast iron manholes and manhole covers, the property of the Corporation, are now on the premises of.....
Patterns
.....
Should the Contractor use other than these they shall be at his sole cost and must be provided for in his Bid.

233. All work is to be done to the satisfaction of the Engineer or of his assistants or agents authorized by him to act in his stead,
Inspection who will have power to visit the foundry or shops where the work is being done, to examine patterns, metals and workmanship, and reject any of them not in accordance with the specifications, or otherwise unsatisfactory.

234. Joints of cast iron pipes are to be made with hot lead or lead wool, thoroughly caulked and made absolutely water-tight.
Joints The whole of the iron work required in connection with the sewer, unless otherwise shown on the plans, is to be provided and set in place by the Contractor, and to be included in his Bid.

SPECIAL STRUCTURES

235.
.....
.....
.....
.....

EXPLOSIVES AND BLASTING

236. Explosives in proper quantities shall be stored and secured in approved manner and only at places approved by the
Explosives and blasting Engineer. They shall be handled with great care and shall be at all times in charge of a competent watchman.
Blasting shall be conducted so as not to endanger persons or property and the Contractor shall be held responsible for and shall make good any damage caused thereby. He shall comply with all the laws and ordinances governing this class of work. Each blast, before being fired, shall be carefully covered with heave timbers, mats or other material to prevent stone from flying. No blasting shall be done within twenty-five (25) feet of completed sewer.

INSPECTOR'S DAILY REPORT.

Contract _____ Date _____

Description of work _____

Temp. A.M. _____ Weather A.M. _____

Temp. P.M. _____ Weather P.M. _____

Class of labor working and material received on job.	Marking of Material.	Material returned to stores or left over.	Labor Hours.	Number of units or material	Wage rate per hour.	Material Unit Price.	Dr.	Cr.
Total...								

NOTE.—Inspector is required to fill in number of bags of cement, units of broken stone, sand, oil for forms, lumber, nails, etc., as accurately as possible. This is his duty.

Engineer in Charge.

APPENDIX "A."

CONTRACTOR'S PAY SHEET AND LIST OF MATERIAL RECEIVED ON WORKS.

Name of Contractor.....

Project "....."

Month of		Labor.																																		
Name.	Employment.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Days.	Rate.	Total.	

Summary:

Previous labor.....

Previous material.....

Labor for the month of.....\$.....

Material for the month of.....

Contractor's total liability to date.....

Principal, Total payment made to date.....

Over

STATEMENT—Summary of Contractor's Costs.

Description of Work.	Labor and Material.				Unit Costs.		
	Class of Labor Material Summary.	Hours.	Number of Units.	Wage rate per hour.	Material Unit price.	Total Expenditure.	Quantity.
							Calculated Unit Price.
							Total Amount.

NOTE.—Allow 20% interest and depreciation, upon capitalized Value of Plant to these figures for number of days including moving.

APPENDIX “A”

APPENDIX "A"

The reports appearing in this Appendix were received from the Secretaries of the Local Boards of Health of the cities and towns of the Province of Ontario, in conformity with section 23, ss. 3, of the Public Health Act, and have been edited by the Secretary of the Board.

FORT WILLIAM.

DR. E. B. OLIVER, M.O.H.

In accordance with the provisions of the Ontario Public Health Act, I beg to submit herewith my annual report for the year ending October 31st, 1916.

The great outstanding feature of the report this year is that it shows a reduction in the number of cases and deaths from typhoid fever to a point which is the lowest this municipality has ever had. This, gentlemen, is a delightful condition of affairs. It has been brought about in the first place by the installation of our present excellent system of waterworks; in the second place by the careful supervision of our dairies and in other ways by the construction of manure boxes to comply with the provisions of the Ontario Public Health Act, by the by-law adopting a standard privy for our city and by the educational campaign that has been carried on for the proper care of garbage by the householder. The whole duty of a health department is to lessen the morbidity, and, therefore, mortality. While our statistics will show that the total death rate is higher this year than last this can be shown to be due to causes outside our immediate control.

But we must not rest because we have succeeded in bringing the typhoid rate down to a low level. The other side of the picture shows plenty of work to be done. There were five less deaths from tuberculosis of the lungs reported this year than last. There were sixteen more deaths from whooping cough. There were several more from measles and diphtheria.

Education is the only method by which we can reach the people and prevent this useless waste of human life from whooping cough and measles. And the only method of education that will reach home is to employ a visiting health nurse to visit in the homes. When I tell you that with one exception all deaths from whooping cough were those of children under two years of age you can understand this measure. The permanent employment of a visiting health nurse on your staff will help to cut down this infant mortality. No other method of dealing with the problem has shown better results.

Our infant mortality is higher this year than last. As is always the case, the coal dock region is the part of the city that contributes most largely. Of the twenty-eight deaths occurring in July and August, twenty-two were from the region we know as the "coal dock." We will always have this region responsible for the large number of deaths until the sanitation of the part is improved. It is not by chance these infants die. It is purely a matter of cause and effect.

The Anti-Tuberculosis Society which works in harmony with the health department has assisted in the campaign against tuberculosis. But so much remains to be done that there will be no success worthy the name until our citizens realize that every year many of our people fall by the wayside from this dread plague and that every death is due to carelessness and ignorance.

The work of abolishing the privies remains at a standstill. There were eighteen less sanitary connections made than in the previous year. I am including in this report a short report from the superintendent of the cleansing department.

As in former years we have kept well within our estimate.

Our vital statistics show the following:

Deaths, including non-residents, three hundred and twenty-one; deaths of non-residents, by this is meant residents of other municipalities who died there and whose deaths are registered in our municipality, forty-two; still births, thirty-two.

Estimated population	18,850
----------------------------	--------

Death rate per 1,000 (including non-residents)	15.33
--	-------

Death rate per 1,000 (excluding non-residents)	13.26
--	-------

Death rate per 1,000 (including non-residents and still births)	17.03
---	-------

The rate 13.26 includes all who died in the municipality. In many cases they were travellers, as for example, the three men killed in the C.P.R. wreck in December. So our actual death rate would be below this.

Birth rate per 1,000 (excluding still births)	47.85
---	-------

This is 3.59 lower than last year.

Infant mortality rate per 1,000 births	117.51
--	--------

This is practically the same as it was in 1914, but it is considerably higher than last year when the rate was 85.05 per 1,000.

Thirteen regularly called meetings of the board were held during the year. Several informal meetings were held.

COMMUNICABLE DISEASES.

Smallpox.—There were but three cases of this disease during the year. Two were discovered in a local hotel and one was located on a troop train from the west. No contacts took the disease which was of a mild type.

Year.	Cases Reported.	Deaths.
1913	11	0
1914	0	0
1915	8	0
1916	3	0

Scarlet Fever.—There were but four cases of this disease with no deaths.

Year.	Cases Reported.	Deaths.
1912	12	0
1913	45	1
1914	110	2
1915	18	0
1916	4	0

Diphtheria.—There were thirty-three cases of this disease reported during the year with five deaths. This is the largest number of cases ever reported in one year and the highest death rate since 1910. There is no doubt that the lessened resistance due to a previous attack of measles allowed the disease to develop in many cases. One of the deaths occurred out of the city and was reported here.

Year.	Cases Reported.	Deaths.
1912	12	0
1913	19	2
1914	24	2
1915	25	2
1916	33	5

Measles. The largest number of cases of this disease ever reported in one year were registered. Unfortunately there were seven deaths. Five of these were in the "coal dock." All were under the age of two years.

Year.	Cases Reported.	Deaths.
1912	98	0
1913	144	0
1914	279	1
1915	8	0
1916	581	7

Whooping Cough.—The number of cases of this disease is greater than the total of all previous years combined. There were seventeen deaths. Sixteen of the fatal cases were under two years of age. The other was three years of age.

Year.	Cases Reported.	Deaths.
1912	4	8
1913	1	3
1914	0	1
1915	33	2
1916	196	17

Poliomyelitis.—This is the first year that cases of this disease have been reported as poliomyelitis. Probably cases of this disease were reported under another name. The prevalence of this disease over wide areas this year caused a stricter investigation into conditions, thus producing better reports. There were ten cases originating in the city and one in Neebing, treated here. The fatality rate coincides with that of other cities that have had cases.

Year.	Cases Reported.	Deaths.
1916	11	3

Erysipelas.—Below are the statistics of this disease during the last three years.

Year.	Cases Reported.	Deaths.
1914	11	4
1915	5	0
1916	6	1

Mumps.

Year.	Cases Reported.	Deaths.
1914	3	0
1915	3	0
1916	16	0

Chickenpox.

Year.	Cases Reported.	Deaths.
1912	17	0
1913	19	0
1914	52	0
1915	94	0
1916	51	0

Typhoid Fever.—Last year I stated that we had the lowest number of cases of this disease we had ever had. I am pleased to be able to say that this year the number of cases is five less than last year. There were but two deaths, giving us the lowest death rate we have ever had, 10.60 per 100,000.

Year.	Cases Reported.	Deaths.
1912	48	6
1913	80	5
1914	35	5
1915	23	7
1916	18	2

Pulmonary Tuberculosis.—There were eighteen deaths from this disease reported for the year. This is five less than last year.

Year.	Cases Reported.	Deaths.
1913	12	19
1914	17	11
1915	23	23
1916	19	18

MISS K. SPEARING, SCHOOL NURSE.

As requested by you, I take pleasure in handing you herewith my report for the seven months of the school year ending October 31st, 1916.

Month.	Inspections.	Instructions.	Exclusions.	Home Calls.
1915				
November	1,284	104	20	70
December	544	35	12	22
1916				
January	1,023	76	30	35
February	1,122	86	14	39
March	1,213	330	18	31
April	660	105	8	31
May	760	118	14	76
September	572		29	29
October	713		13	47
	7,891	854	158	380

Exclusions were for pediculosis, chickenpox, severe coughs and colds, swollen glands, ringworm, whooping cough, sore eyes, sore throat, measles, uncleanness, etc.

Medical Relief.

The following is the report of medical relief work for the year.

Month.	Visits Made.	Office Consultations.	Obstetric Cases Conducted.	Anæsthetics Administered.
1915				
November	13	5	3	
December	17	4		
1916				
January	11	11	.....	1
February	22	6		
March	15	6		
April	4	3		
May	3	4		
June	4	4		
July	2	4		
August .....	.....	4		
September	2	1		
October	2	1	.....	2
	95	53	3	3

Laboratory Report.

The work in the laboratory has increased this year. An up-to-date incubator was added thus facilitating the diphtheria work.

There were two hundred and sixty-two examinations for dirt and butter fat of milk taken from licensed dairies. The result of these tests is here shown.

Name of Vendor.	No. of Tests.	Clean.	Slightly Dirty.	Dirty.	Fat.
Brown Bros.....	8	8	.....	.....	3.27
H. Crabtree.....	16	13	2	1	3.61
City Dairy.....	23	19	2	2	3.37
J. A. Kellough.....	27	26	1	.....	3.70
R. Lewtas	7	4	1	2	3.43
F. McCarthy	20	17	3	.....	3.46
Jas. Otway	19	17	2	.....	3.51
Jno. Otway	13	13	.....	.....	3.61
Ed. Otway.....	10	10	.....	.....	3.32
J. Parker.....	16	13	3	.....	3.83
A. Rasilanen.....	7	5	1	1	3.08
F. Scollie.....	35	33	1	1	3.44
R. Sheehan	8	4	3	1	3.45
D. R. Thompson.....	24	22	2	.....	3.27
B. Webster	13	12	1	.....	3.16
F. Widnall.....	16	16	.....	.....	3.60

Comparison for cleanliness should not be made without taking into consideration the number of samples taken. Nevertheless it is noteworthy that of forty-seven samples taken from four dealers all were clean. Six dealers fell below 3.4 per cent. for butter fat. Ten were above 3.4 per cent., while the minimum allowed by law (Ontario Milk Act) is 3.0 per cent. I do not consider anything below 3.4 per cent. good milk.

Each of two dealers had two dirty samples. This is not a good showing for these men.

Fifty-one other samples of cows' milk were examined, mostly from private sources. Five specimens of breast milk were examined.

Twenty-five samples of cream were examined.

15

One hundred and one swabs were examined for diphtheria infection as follows:

	Positive.	Negative.	Total
For diagnosis	21	45	66
For release	3	32	35

Fifty-one examinations of sputum for T. B. were made of which seven were positive and forty-one were negative.

Seventeen urinalyses were made on account of medical relief.

The total of work done is summarized as follows:

Samples of milk examined	313
Samples of breast milk examined	5
Samples of cream examined	25
Diphtheria swabs examined	101
Specimens of sputum examined	51
Urinalyses for medical relief cases	17
Total	512

W. E. STANLEY, SANITARY INSPECTOR.

I beg to submit my annual report for the year ending October 31st, 1916.

Nuisances.

The following table shows the number and character of nuisances dealt with during the year:

Dealt with by written notice.

Insanitary Premises.	Animals not properly kept.	Plumbing defects.	Garbage nuisances.	Privy nuisances.	Manure nuisances.	Total.
14	10	13	37	3	34	111

Complaints of nuisances have been very few during the year. The number of written notices is small. I find that in most cases nuisances can be dealt with by a personal interview. In speaking of nuisances I must exclude the coal dock section as there are many nuisances existing which cannot be dealt with until sewer connections are put in. It was found necessary to prosecute in only one case for neglect in the abatement of nuisances, the defendant being fined one dollar and costs. Owing to the exodus of the foreign population overcrowding is not by any means so prevalent as it was. One of the greatest nuisances is the keeping of chickens. Several instances have been found where they were hatched and kept in the house.

Three hundred and fourteen visits were made in connection with nuisances.

Infectious Diseases.

The year has been a very busy one in connection with infectious diseases, owing to the prevalence of measles. Six hundred and fifty-nine visits were made in this connection.

Twenty-eight houses were fumigated with a capacity of 95,000 cubic feet. A troop train was also fumigated.

Dairies and Cowbarns.

During the past year there has been a reduction in the number of retailers of milk. Owing to constant supervision a marked improvement has been made in the cleanliness and fat content of milk, one prosecution only having been instituted for dirty milk.

The old type of cowstable with its low ceiling, wood floors, defective lighting and ventilation has been entirely eliminated. Seven hundred and eight inspections have been made during the year. This number is not up to the number of inspections of previous years owing to the fact that this year I have no assistant. On the other hand such frequent inspections are not necessary owing to the better class of building.

I made one hundred examinations of milk for dirt and temperature in the dairies of those who secure milk from the country districts. This milk is constantly improving and now compares favorably with milk produced in the city.

After much persuasion the city milk vendors have been induced to carry ice during the hot summer months.

If we are to believe the statements of dairy experts there must be a certain percentage of dairy cattle in this district affected with tuberculosis and I should like to see all cattle put through the tuberculin test. I am sure the results would amply justify the expense incurred.

The two largest dealers who deal exclusively with farmers' supplies have put in pasteurizers and all their milk retailed is sold in bottles. We have still with us the old pattern of person—usually a foreigner—who keeps one or two cows ostensibly for his own use, but who undoubtedly sells a considerable amount to persons who call for it. This is a difficult matter with which to deal.

I have collected during the year from the rigs of milk retailers two hundred and one samples of milk for the purpose of laboratory examination.

Seven hundred and eight inspections were made.

Restaurants.

There has been a considerable reduction in the number of licensed restaurants. There are now ten as against twenty-five last year. They are kept under constant supervision and generally speaking are well conducted and kept satisfactorily and in a sanitary manner.

Four hundred and seventy-four inspections were made.

Store and Food Supplies.

All stores dealing with food stuffs are kept under constant supervision. Bread retailers and bakeries are regularly inspected and absolute cleanliness insisted upon. Bread is frequently weighed and kept up to the lawful standard weight.

Three hundred and seven inspections were made to bakeries alone.

The following articles were condemned as being unfit for food (exclusive of meat). 420 doz. of tinned fruit; 170 gals. of pickles; 150 lbs. of tea; 240 lbs. of lard; 100 lbs. of sugar.

Ice cream and candy stores are regularly visited, one hundred and sixty-six inspections having been made.

Plumbing Installations.

During the past year no plumbing has been installed by notice. This is much to be regretted as our most serious nuisances arise from the lack of sanitary conveniences. The ground upon which houses are built without sanitary conveniences is sodden with sewage which is a constant menace to the health of the inmates, particularly to infants, a fact which is amply borne out by the mortality statistics. It is a most difficult matter to induce people who live under such conditions to keep their premises clean and tidy.

Thirty-two installations have been made by the request of the owners, the work being done by the city.

Abattoir Report.

During the year the abattoir has been in constant operation although handicapped by deep snow in the early part of the year which prevented cattle being brought in from the farms and a fire which occurred in September. The work has been carried on satisfactorily and the results amply justify its establishment.

For the first few months tubercular cattle slaughtered were, if not numerous, more commonly found than they are now, when one is rarely found. This I attribute to the constant inspections, every animal slaughtered being inspected and condemned if diseased. The dealer will consequently not now take any risk and refuses to buy any suspicious looking animals.

A great improvement was made to the building by the partition of the meat store and the forming of a cold storage at a cost of \$102.20. The owners allowed a rebate of two months' rent amounting to \$90.00 towards this cost. The users of the abattoir furnish their own ice.

The viscera of three animals was condemned, also six head of cattle. Three were affected with tuberculosis and three had been killed after being injured.

The number of animals slaughtered was 1,049, a summary of which and a table of the revenue and expenditure for the year follows:

[illegible]

H. J. PADDINGTON, CLEANSING SUPERINTENDENT.

Herewith I beg to submit a report on that portion of our work which has a bearing on the work of the health department.

Garbage Collection.

Much has been done during this year to have the requirements of the law concerning receptacles more faithfully carried out. The progress made, however, is not as great as is required. The authorities were mostly concerned with having the receptacle placed on the rear of the lot, their view being an economical one only. As a matter of fact, the question of a proper covered receptacle is of more economical importance in addition to being a direct preventive against disease. It is our intention to have this matter dealt with in future as a nuisance. Whether the intention is carried out or not rests entirely with the authorities.

It is possible that during the early part of 1917 the question will be raised of collecting garbage and nightsoil by contract. I would advise against reverting to a system which is condemned by all leading experts of the present day.

Nightsoil Collection.

The number of privies has been slightly reduced during this year. This is due, not to the increased number of sanitary connections put in, but to the very few new shacks which have been built.

The number of sanitary connections made was thirty-two as against fifty in 1915, whilst five houses have been added to the collection as against thirty in 1915. The sanitary connections made also reduces the number of privies on sewered streets from six hundred and forty to six hundred and twenty-six.

Nuisance Ground.

The condition of the nuisance ground has never been better than during this year. The suggestion of Dr. George to cover the trench contents every few days has been carried out with the result that the number of flies has been reduced to a minimum.

Spring Clean Up.

In spite of an excessive snowfall during last winter the quantity of refuse removed in the clean up campaign this year was less than ever before. The main reason for this is the cultivation of back gardens. When a garden is under cultivation the odds

and ends of rubbish, which under different conditions would be left lying around, are regularly picked up and put in the garbage can or in most cases burnt by the owner. To all appearances the clean up campaign will soon be necessary only for those who take no interest in a clean city.

MISS F. K. FISHER, VISITING HEALTH NURSE.

I beg to submit my report for the four and one-half months I was on your staff (May 15th to September 30th).

Conditions seem to be improving in the coal dock section, in which part of the city most of my work is carried on. Overcrowding is the great drawback to the proper upbringing of the infant.

Below will be found a summary of the work done:

Month.	No. of visits.	New babes visited.	Breast fed.	Mod. milk.	Cond. milk.	Patent foods.	Mixed food.	Special calls.
May	120	.....	80	12	5	1	22	.....
June	369	.....	210	32	8	10	82	27
July	472	102	74	20	2	2	4	72
August	481	81	68	6	3	4	.....	209
September...	392	63	58	2	.....	3	.....	.....
	1,834	246	490	72	18	20	108	308

The total number of visits made was 1,834. The cost per visit was 18.73 cents, made up as follows:

Salary of nurse	\$325 00
Auto service	8 50
Car tickets	10 00
	<hr/>
	\$343 50

BIRTHS REGISTERED IN THE CITY OF FORT WILLIAM

For the Year ending October 31st, 1916.

—	Males.	Females.	Total.	Twins.	Triplets.
1915					
November	45	48	93	1	
December	50	48	98	.....	1
1916					
January	45	30	75	2	
February	40	36	76	2	
March	42	34	76	2	
April	27	32	59		
May	47	26	73	2	
June	29	37	66		
July	31	42	73		
August	33	38	71		
September	36	28	64	1	
October	40	38	78	1	
	465	437	902	11	1

STILL BIRTHS

—	Male.	Female.	Total.
1915			
November	2	.....	2
December	2	1	3
1916			
January	1	.....	1
February	3	2	5
March	2	1	3
April .....	.....	.....	.....
May	2	2	4
June	1	3	4
July	1	.....	1
August	2	1	3
September	2	1	3
October	2	1	3
	20	12	32

CAUSE OF MORTALITY.

Infants under one year.

Number on International List.	—	—
104	Diarrhœa and Enteritis (under two years).....	30
151	Congenital Debility, etc.....	25
91	Bronchopneumonia	14
8	Whooping Cough	8
152	Other diseases peculiar to early infancy.....	6
71	Convulsions of infants.....	4
92	Pneumonia	4
6	Measles	3
76	Diseases of the ears	2
110	Other diseases of the intestines	2
150	Congenital malformations.....	2
189	Cause of death not specified	1
10	Influenza.....	1
31	Abdominal Tuberculosis.....	1
61	Meningitis	1
89	Acute Bronchitis	1
103	Other diseases of the stomach.....	1

GALT.

DR. J. H. RADFORD, M.O.H.

The Medical Officer of Health of the City of Galt begs herewith to submit his report for the months of July, August, September, October and November, and in doing so would again draw your attention (as has been heretofore done by my predecessor, the late Dr. Vardon), to the great difficulty in securing adequate service for the collection and disposal of nightsoil due principally to the fact that it is absolutely impossible to educate the citizens as to the necessity of their paying for the service in advance.

In my opinion the only way to overcome this difficulty regarding the payment is to petition the City Council to charge the amount necessary in the taxes as is done in connection with the garbage system or to pass a by-law, as was done in the town of Smith's Falls, compelling each owner to connect with the sewer as and when the Local Board of Health may direct wherever it is possible to make such connections.

The quantity and quality of our milk supply is a matter of very great importance to the citizens generally but as health officers, we are only concerned with the quality,

and I regret very much to be compelled to state that I am not satisfied with the quality either from the low butter fat tests or the dirt tests. In the former I am pleased to state that it has greatly improved, whilst in the latter I cannot see much improvement. I look upon clean milk as of very much greater importance to the citizens than butter fat and I trust that the vendors will insist on the producers supplying them with clean, wholesome milk, as they are primarily responsible to the Board.

The water supply is adequate and free from contamination of any kind.

The Swiss Cottage has been opened for a period of sixteen days during the month of July for the purpose of caring for a case of diphtheria, and for a similar period in the early part of the month of October, for the care of a case of scarlet fever. Since that time it has been open continuously for the reception and care of the soldiers connected with the 122nd Battalion suffering from measles and a contagious form of sore throat.

The work done by the public school nurse has been entirely satisfactory to me and in my opinion the Board is to be congratulated and commended on their appointment of such an efficient young lady.

Until six weeks ago the city was comparatively free from any contagious diseases and I was beginning to think that the year would end without any serious epidemic, but alas, my hopes and wishes were blighted by the sudden outbreak of german measles among the 122nd Battalion, which outbreak has extended to almost every part of the city.

We have also an epidemic of chickenpox, the extent of which will be shown by the report of the division registrar.

In conclusion, I hope and trust that the medical men of the city and the citizens generally will give us every assistance possible for the purpose of stamping out these two epidemics.

R. A. WILSON, SANITARY INSPECTOR.

I herewith beg to submit my report for the year 1916.

During the year I have visited all parts of the city and while my other duties prevented my visiting each individual place, I satisfied myself that I covered the ground pretty thoroughly.

Many places were found in an unsanitary condition that have been remedied, in some instances though I had to make three visits to see that my orders were carried out.

I attended to every complaint that was made to me and where such complaints were justified I saw that the nuisance was abated.

I visited all restaurants and laundries once a month and saw that those places were kept in a proper sanitary condition.

I have put up 145 placards on houses where communicable diseases existed, as follows: For measles, 143; for scarlet fever, 1; for typhoid fever, 1; 21 placards are now on houses for measles.

I have disinfected 17 houses as follows: For tuberculosis, 6; for measles, 4; for diphtheria, 4; for cancer, 2; for erysipelas, 1.

I have also collected samples of milk from all milk vendors at nine different times and had tests made.

GUELPH.

DR. H. O. HOWITT, M.O.H.

I beg to submit my report for the year ending November 30th, 1916.

CONTENTS OF REPORT.

1. The Infectious Fevers.
2. The Milk Tests.
3. The Water Supply.

The records of deaths, marriages and births do not now pass through this office so their tabulation is omitted from this report. We, of course, have to deal with the infectious diseases, and we note that from the year commencing November 1st, 1915, and ending October 31st, 1916, there were 955 cases of an infectious nature reported to this Board.

Scarlet Fever.—November, three cases; December, one case; January, 1916, one case; February, two cases; March, two cases; April, one case; May, two cases; June, one case; July, none; August, one case; September, one case; October, one case; total, 16. No deaths.

Diphtheria.—November, one case; December, two cases; January, one case; February, three cases; March, none; April, none; May, none; June, one case; July, one case; August, none; September, none; October, none; total, nine cases. One death.

Measles.—November, none; December, three cases; January, seventeen cases; February one hundred and thirty-one cases; March, four hundred and fifty cases; April, two hundred and twenty-nine cases; May, fifty-two cases; June fourteen cases; July, none; August, none; September, none; October, none; total, eight hundred and ninety-six cases. Nine deaths.

German Measles.—There were four cases in February, 1916, but in no other month was there a case. No deaths.

Chickenpox.—November, none; December, one case; January, two cases; February, one case; March, one case; but no other throughout the year and no deaths.

Typhoid Fever.—There were two cases in February and no other cases throughout the year. No deaths.

This is a good record and is, perhaps, an excellent testimonial to the efficiency of the disinfectant which is daily added to the water, e.g.—chlorination.

Whooping Cough.—April, four cases; August, two cases; October, four cases; no others throughout the year. Total, ten cases. No deaths.

Mumps.—August, one case; October, nine cases. Total ten cases. One death.

Cerebro-Spinal Meningitis.—October, one case; total, one case. One death.

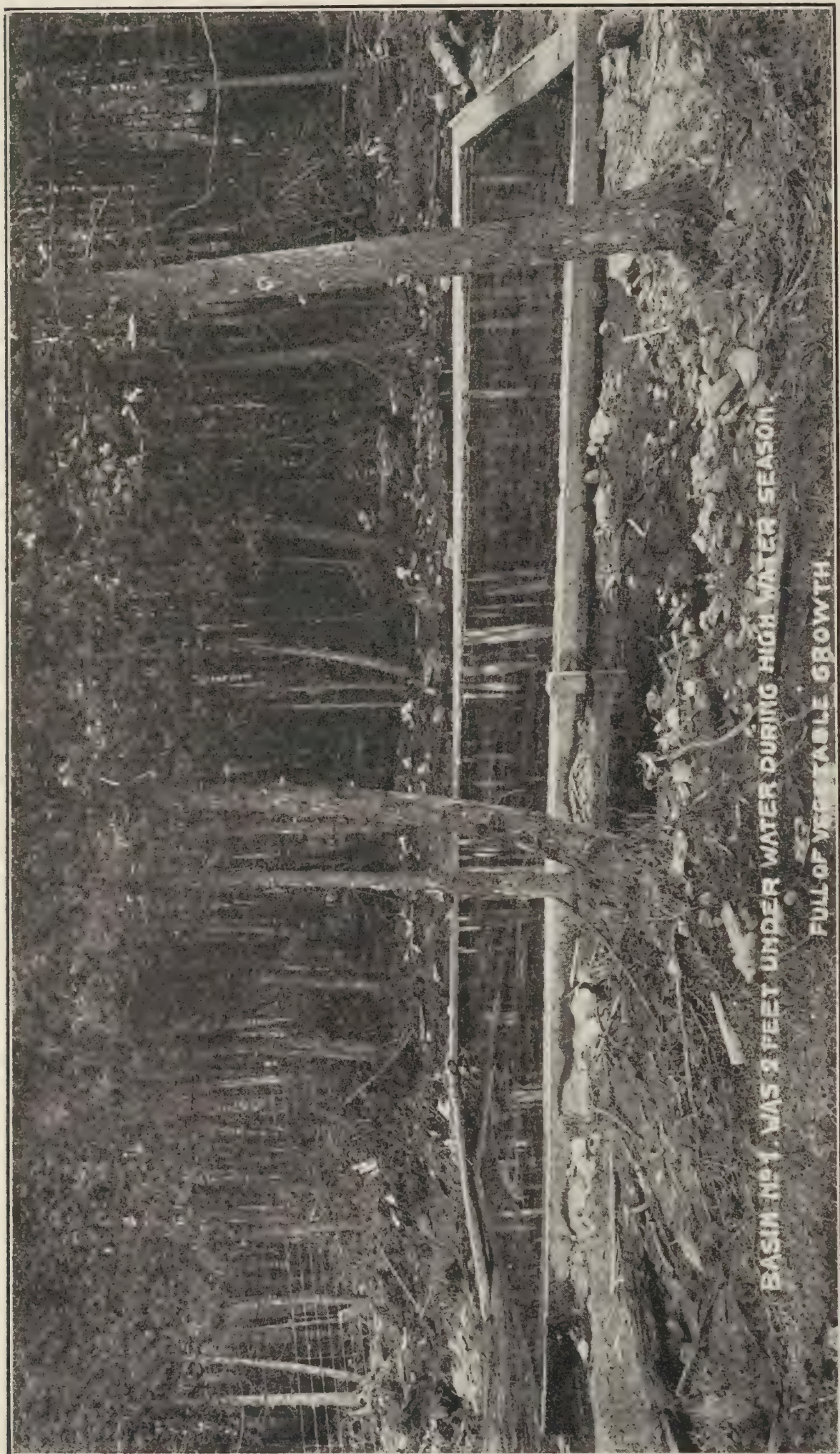
With the exception of the measles, this is a good record, leaving less than sixty cases for the other communicable diseases combined. It is to be noted that in Guelph, during the year just ended, that measles caused three times as many deaths as all other infectious diseases combined.

The reason for such a large number of cases of measles is to be attributed to persons who concealed the presence of measles early in December, 1915, and in January, 1916. I feel that it is due to the fact that some mild cases were concealed that this disease got its start and caused nine deaths, possible unnecessary deaths. I say unnecessary not meaning that they were not properly treated, but meaning that they might not have contracted the disease had notification and isolation taken place.

Milk Tests.

Three per cent. butter fats is a fairly good test. Anything up to near three and one-half is good and above this is excellent. Anything below 2.5 per cent. butter fats is a very poor test indeed. The following is the result of the standing of the various milk dealers as judged by tests made last summer.

License No.	Vendor's Name.	% Butter Fat.
17	Geo. Burns	3.25
5	E. Hudson	3.75
.....	J. Sharp	2.85
1	J. Sharp	2.85
24	F. Boreham	4.01
46	H. McKinnon	2.07
18	— Cross	3.03
.....	J. Stout (Jr.)	2.95
26	Thos. Croft	4.06
2	Farr Bros	3.07
25	W. Telford	3.75
20	Yates & Darnell	3.65
17	Geo. Bowles	3.02
.....	Model Dairy (Pasteurized)	3.05
.....	“ “ (Not Pasteurized)	3.02
14	Thos. Heeley	3.01
19	W. Poole	3.05
4	J. Hattin	4.09
7	H. Carter	3.00
10	W. Noble	3.75
27	W. Green	3.09
13	W. Newstead	3.03
23	Alice Cass	3.07
18	J. Stout (Sr.)	3.08
12	Jas. Kaine	4.25



Basin No. 1. Guelph water supply under old conditions.

The City's Water Supply.

Then last, but in retrospect most important, we come to the water supply.

The conclusion is forced upon us that the great mistake was made when the water pipe line was first installed. The fault lies in the construction of the line. Had the commissioners in office, at that time insisted upon an iron pipe, or some other material of impermeable substance—the contamination, broken pipes, and leaks would not have occupied our attention as they have in the past two years. The engineers to-day estimate the cost of installing iron pipe, as very much in excess of \$75,000.00.

So the citizens are confronted with only two alternatives.

(1) To go on as we are, with a disinfectant (chlorination) in the water all the time.

(2) Or to spend again an amount of money, almost as much as the original cost of the water line.

(1) If we keep on using the present patched up line, then daily, in fact, constantly, chlorination must go on indefinitely. This has been done ever since this Board, and the Provincial Board of Health stepped in, in December, 1914; and immediately after we were advised by the Provincial Board of Health, to placard the city warning the citizens of the condition of the water supply, e.g., that the water was contaminated.

There is no danger in using water that is "chlorinated." The addition of the chlorine destroys the harmful germs that may be in the water, and in so doing makes water otherwise harmful—quite safe to drink. Toronto has to chlorinate its water, and many towns and cities in America find it necessary to do the same. The soldiers on active service at the front often have their drinking water so treated. Had chlorination of water been used in South Africa during the war, probably many thousands of lives might have been saved and typhoid fever less known. We in Guelph, have consumed chlorinated water for two years and with few complaints, except during the early months of its operation. Chlorination, whether we like it or not, makes the water safe to drink. If we do not like it, then we are confronted with the other alternative, number (2) e.g., building a new pipe line and replacing the present one. The engineers have recently shocked the taxpayers by estimating the cost at \$75,000.00 as the expense of supplying water "pure crystalline as at the springs."

The Provincial Board of Health naturally could not be expected to order us to adopt No. 2, if the addition of chlorine makes the present supply safe to drink, and we all as taxpayers, feel relieved. The discussions aroused by this Board have resulted in many improvements to the line. Serious sources of contamination have been stopped, many holes in the line have been attended to, the collecting basins made as safe as possible. The head springs were "prospected" for and located—no one connected with the Water Commission was able to state exactly where the head springs were.

In short, much work was completed and useful information gained, which evidently could only be obtained by a general stocktaking like the one of the last few months. Much work was done on the "new line," which was opened this year for the first time. That is, the one freshly added from the Stone and Carter farms. You will remember that we were astounded by the revelations there; the discovery of the fact that the Torrance Creek (condemned a year before and shut out from the old line) was at liberty to enter, and did freely enter the newly constructed line. This opening was the subject of the most important of the photographs taken at that time. The others are with the records of the investigation and speak for themselves.

In short, our work was hard at times to proceed with but now it is all in black and white; and open to any person open to conviction.

There remain only two things possible to be done.

1—Go on with chlorine in the water (which is safe).

2—Or spend thousands of dollars on a first-class line (The engineers were asked for an estimation of the cost and say \$75,000.00 is the minimum).

Then, Gentlemen, I feel that this Board has done a valuable service to the City even if the result has been the revelation of the fact that the water system as it is, is in a way "a shattered idol." It rubs us all against the grain, nevertheless we would be untrue to our positions were we to create any other impression than the correct one.

I commend Major Merewether for his splendid work throughout the year and you all for your valuable assistance.

HAMILTON.

DR. J. ROBERTS, M.O.H.

Below please find report of the Medical Officer of Health for statistical year, beginning November 1st, 1915, and ending October 31st, 1916.

VITAL STATISTICS.

	1915.		1916.	
	Births.	Deaths.	Births.	Deaths.
November.....	239	106	220	112
December.....	231	135	240	110
January.....	236	92	242	162
February.....	243	99	243	136
March.....	284	119	271	138
April.....	231	114	229	133
May.....	248	104	242	97
June.....	231	72	233	96
July.....	241	118	291	98
August.....	239	147	244	117
September.....	230	118	221	112
October.....	243	117	233	111
Total.....	2,896	1,341	2,909	1,422

SUMMARY OF COMMUNICABLE DISEASES REPORTED FROM NOVEMBER 1ST, 1915,
TO OCTOBER 31ST, 1916.

Diseases.	1915.		1916										Total.
	Nov.	Dec.	Jan.	Feb.	Mar	Apl.	May	June	July	Aug.	Sep.	Oct.	
Diphtheria....	42	27	24	17	16	9	15	9	4	3	7	50	223
Mumps.....	14	27	20	86	249	157	121	41	10	2	1	5	733
Chickenpox...	23	29	46	48	51	25	38	21	11	2	3	10	307
Consumption..	14	9	12	16	10	13	13	19	14	23	6	14	163
Poliomyelitis..	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	14	2	17
Whoopingcough	34	39	47	84	91	51	73	32	20	5	10	12	489
Scarlet fever..	12	12	12	17	8	5	5	2	.....	5	.....	6	84
Measles.....	5	7	34	44	52	107	282	253	158	18	22	51	1,033
Erysipelas....	.....	4	1	2	3	....	2	.....	1	.....	.....	.....	13
Typhoid fever.	3	1	1	1	....	.....	.....	.....	.....	1	7	2	16
Totals....	147	155	197	315	480	367	549	377	219	59	70	152	3,087

SHOWING DEATHS FROM COMMUNICABLE DISEASE FROM NOVEMBER 1ST, 1915,
TO OCTOBER 31ST, 1916.

Diseases.	1915.		1916										Total.
	Nov.	Dec.	Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.	Sept.	Oct.	
Diphtheria....	3	3	5	2	7	4	2	1	.....	.....	2	6	35
Typhoid fever.	.....	.....	.....	2	.....	1	.....	.....	.....	.....	.....	.....	3
Measles .....	.....	.....	.....	.....	2	2	.....	.....	3	.....	.....	.....	7
Whoopingcough	2	.....	1	.....	.....	.....	.....	.....	1	.....	.....	1	5
Erysipelas....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	2
La Grippe ....	.....	.....	7	5	1	.....	.....	.....	.....	.....	.....	.....	13
Consumption..	4	3	2	14	8	11	5	6	9	9	1	5	77
Tuberculosis (other forms)	1	2	....	2	2	1	2	2	.....	.....	1	1	14
Cerebro-spinal Meningitis ..	1	1	1	1	1	.....	.....	1	.....	.....	.....	.....	6
Totals	11	9	16	26	22	20	9	10	13	9	4	13	162

DR. W. R. JAFFREY, BACTERIOLOGIST.

I herewith report work done in the city laboratories for the year ending October 31st, 1916.

Summary.	Positive.	Negative.	Total.	Total, 1915.
Wassermanns.....	214	435	649	569
Throat Cultures.....	322	2,301	2,623	1,822
Sputums.....	88	452	540	594
Widals	47	102	149	192
G. C. Smears.....	32	373	405	133

Specimens of milk from various supplies were examined bacteriologically in conjunction with the field work of the food inspector.

Specimens of water from the city supply were examined daily and at no time did they show serious contamination. During the hot weather numerous surveys were made of the supply and numerous samples came in from private supplies.

Specimens of market meats were examined at various times for the food inspector.

Total examinations for the year are 4,366, an increase of 1,056 over last year's total of 3,310.

KITCHENER.

DR. J. MCGILLAWEE, M.O.H.

I beg to submit herewith my annual report for the year 1916.

There were 246 deaths registered during the year.

There were nine deaths from pulmonary tuberculosis, one death from tubercular meningitis and one from tubercular peritonitis.

There were six deaths from cancer, which is an improvement on 1915, when there were 16 deaths registered from cancer.

There was an epidemic of measles during the early part of the year, which, in spite of all efforts to control, spread over the entire city. There were between 700 and 800 cases quarantined.

There were two deaths from pneumonia following measles, which is a good showing considering the number of cases.

There were several cases of typhoid treated in the Kitchener and Waterloo Hospital, but in none of the cases was the disease contracted in the city. No deaths from typhoid.

There were eighteen cases of diphtheria with three deaths; one death from malignant diphtheria, one from paralysis following diphtheria, and in the third case the physician was called too late.

There were two cases of infantile paralysis, both of which recovered.

The milk tests have, on the whole, been satisfactory. A milk by-law was passed by the City Council in October. The by-law is at present in the hands of the Provincial Department of Agriculture for approval.

The slaughter houses in the city and the slaughter houses in the surrounding country which supply meat to the city were inspected by the Board at different times during the year and in several cases necessary improvements were ordered.

We had considerable trouble with the city water during the summer but no serious effects. With the plans that are at present under way, the trouble will be avoided in future.

KINGSTON.

DR. A. R. B. WILLIAMSON, M.O.H.

I submit herewith my annual report on matters of public health which have come under my observation during the past year.

During the past two years the number of contagious diseases of serious nature has been increased owing to the fact that we have had from two to ten thousand troops stationed here at various times. During the past year there were reported to me:

Diphtheria	40 cases.
Measles	20 “
Scarlet Fever	8 “
Epidemic Meningitis	11 “
Typhoid Fever	14 “

and a few cases of chickenpox and mumps. Regarding these nothing noteworthy is to be recorded except in case of epidemic cerebro-spinal meningitis. As a rule this disease has a high mortality, but though early diagnosis by examination of the cerebro-spinal fluid, and the early employment of intraspinal intramuscular and subcutaneous injections of flexnius serum repeated two or three times in the first twenty-four hours, when necessary, the death rate has been extremely low and the disease has been rapidly stamped out by the isolation of carriers.

The maintenance of a civic incinerator, while somewhat more costly than originally estimated amply justifies the expenditure as the report of the sanitary inspector shows. The increased cost is due in part to the heavy demand made on it by the presence of troops in quarters, and further, to the fact that not only garbage but everything in the nature of filth that is combustible is collected and destroyed.

The housing question has been given careful consideration. There are many difficulties in the way of rapid improvement at the present time, one being the actual shortage of houses in the city, and another very important one is the fact that the unsanitary conditions are created by the tenant and should not be charged up to the property. Steady improvement has been made, however, particularly in the line of plumbing and fixtures. Every addition of this latter nature calls for increased sewer accommodation and brings before us more acutely the problem of sewage disposal. We have been fortunately or unfortunately situated in having a great body of fresh water at our doors into which our sewage could be dumped, but common sense tells us that there is a limit to the time that this simple method can be carried on and we can still hope to get pure drinking water from the great natural supply which is being constantly polluted by our sewage. If we continue pollution then we must adopt the best possible methods, chemical, bacterial, etc., to render the water supply fit for human consumption, and this at best, is a makeshift as it may protect us but does not protect thousands of others who have to use this source of water supply without means of purification. The sooner we face the fact that ultimately we will be compelled to forego the privilege of polluting our great lakes and rivers and install systems for the collecting and purification of our sewage the better it will be for the health of this community.

Within the past few months the Board was asked by the City Council to investigate unsanitary conditions said to prevail in two of our schools, viz.: Central and Victoria. This investigation was made and a report duly forwarded to Council.

The Council has recently brought into force a new milk by-law, drafted by the City Solicitor after consultation with those interested in the important question of pure milk supply, with the object of bringing our civic legislation up to date. In order that the

new by-law may be made effective it will be necessary to appoint some one to take charge of the collection of samples, and regular testing of these, the proper inspection of dairies, cattle, byres, etc.

It is almost superfluous to add a word of appreciation of the services of the school nurse. Through her inspection numerous cases of contagious disease, eye, skin, enlarged tonsils, defective teeth, etc., etc., have been referred to the family physicians and dentists and appropriate treatment adopted, hereby increasing the efficiency of the school work, the welfare of the children and through these the welfare of the community in general.

All of which is respectfully submitted.

LONDON.

SAMUEL BAKER, SECRETARY.

I beg to report pursuant to the provisions of Section 23 of the Public Health Act, on the business before the Board of Health for the year 1916.

Sewers.—The Board of Health ordered the construction of the following sewers:

- (a) Eleanor Street sewer.
- (b) Linwood Avenue, Barker to Sterling Streets.
- (c) Ashland Avenue.
- (d) Euclid Avenue.
- (e) Maryboro' Place.
- (f) York, Egerton to Eva Streets.
- (g) Duchess Avenue.
- (h) Byron Avenue.
- (i) Egerton Street, Hackett to Trafalgar Streets.
- (j) Bathurst Street.
- (k) Maryboro' Place.

The Provincial Board of Health was consulted in July on the question of having all privies connected with sewers, and also a general sewerage and sewage disposal for the City of London.

The Provincial Sanitary Engineer submitted a report to the Council on the general situation with needed improvements, and the Board with the Council have the matter under consideration.

The question of providing a sewerage system for the low-lying lands along the river is receiving consideration.

The Board has its Inspector report upon the lack of privy connections with the sanitary sewers, and ordered a rigid enforcement of the By-law which provides that every privy shall be connected with a sanitary sewer system, wherever within one hundred and fifty feet. In some cases it was necessary to take legal proceedings against the parties complained of. Of over 12,000 houses in London, more than half have outdoor toilets (London West excluded).

Water.—Dr. Hill has made weekly examinations of the city water supply, and in almost every case found absence of colon bacilli in 10 cc.

In April of 1916, the presence of colon bacilli was detected in the Springbank water supply. It was found on examination that for several days previous to the collection of the series of samples from Springbank, the spring thaws had been in progress, and considerable surface water must have entered the reservoir and ponds. This was believed to be the cause.

Again in 1916 (June) after heavy rainfalls, colon bacilli were found in small quantities in the water. Arrangements have been directed to deflect the surface water by the construction of a ditch.

On September 19th, 1916, Mr. Henderson reported that with a series of open reservoirs there is always an opportunity for a small amount of surface wash which may introduce colon bacilli, otherwise the water has been found satisfactory.

Milk.—The Veterinary Inspector was instructed to have constant daily inspection of herds while housed, or during the winter months, to use a score card for classification of same; and to make a collection of samples for examination.

Vendors were notified that their license would be cancelled if they took milk from any milk producer until the premises of the said milk producer had been inspected and reported upon by the inspector.

Pamphlets were distributed to milk dealers on pasteurization.

Inspector Tancock reported the dairies as mostly in a first-class condition.

Lard Rendering.—The Board issued orders forbidding butchers to render lard in the Market House, and Inspector Lutman reported that the orders of the Board were obeyed.

Subsequently Mr. Morris was granted a permit for lard rendering in the Market House, provided he used a hood with fan and outlet satisfactory to the Board of Health, and maintain same in satisfactory operation.

Spettigue Rendering Works.—Inspector Lutman with the Provincial Inspector visited the Spettigue Rendering Works and ordered the placing of cement floors in these works.

In June, Inspector Lutman reported that the Spettigue Rendering Works was found in fair condition, but there had been nothing done with respect to improvements recommended by the Board of Health. Mr. Spettigue promised to carry these instructions out.

Toilets.—Sanitary Inspector Lutman submitted a report upon the down town places of business on February 28th, pointing out a marked deficiency. The question was referred to the Provincial Factory Inspector. At the meeting on March 17th, Dr. Hill reported that the Factory Inspector would support the Board.

The Board took up the question of the public comfort stations at Springbank Park and Port Stanley with the Commission, for a control of same, and very great improvement has been made.

Carling's Creek.—The Board took up the question of cleaning out Carling's Creek from Oxford Street to Piccadilly Street, and east of Adelaide Street. In both cases the Board was successful in having the necessary work attended to.

Paving Lanes.—The Board took up the question of paving private lanes with the Council, but as the Council had no power to deal with the matter the Board took action. In several cases the lanes were paved by the ratepayers interested.

Market House.—The Board called the attention of the Council to the unsanitary condition of the basement in the Market House, and requested improvement. Conditions have been improved by the Council.

Barber Shops.—On May 19th, after some consideration, the Board adopted Dr. Hill's regulations respecting barber shops.

The Barber's Association and the Union have approved of the regulations.

Plumbing.—The Board took up the question of the preparation of a plumbing by-law with the Journeymen Plumbers' Association. Building Inspector Piper has been instructed to prepare a by-law and submit same to the Board of Control.

The matter is under consideration by Dr. Hill.

Complaints.—A number of complaints respecting various matters have been, from time to time, considered by the Board and dealt with.

Reports.—Dr. Hill, the Medical Officer of Health, instituted a system of reports to the Board which give a complete detailed statement of contagious diseases in the City of London. In consequence of considerable laxity in this matter in previous years, it is a difficult matter to definitely compare health conditions of 1916 with that of previous years.

Meetings.—The Board of Health held fourteen meetings at which the attendance was as follows, viz.: Chairman Somerville, 13; Mr. Hale, 5; Mr. Saunders, 10; Dr. Hill, 14; Mayor Stevenson, 6.

REPORT OF MEDICAL OFFICER OF HEALTH TO THE BOARD OF HEALTH, LONDON, ONTARIO, FOR THE YEAR ENDING NOVEMBER 30TH, 1916.

Herewith I have the honor of submitting, in accordance with the Public Health Act, the annual report on infectious diseases for the year ending November 30th, 1916. The excellence and completeness of this report is due to the records designed and kept by the statistician of the Institute of Public Health who has acted as vital statistician to your Board during the last year.

I think it well to call once more to your attention the fact, frequently mentioned before and also incorporated in the following report, that the apparently great increase of infectious diseases in this last year as compared with previous years is wholly an illusion depending entirely upon the immensely increased completeness of reporting cases. For instance, in certain previous years only those cases of measles which died were reported. This year practically every case of measles was reported. This statement regarding the apparent increase of cases is no mere guess work, for while we have no official records of previous years worth considering, we do have in the census of public school children conducted by the Institute of Public Health in 1912 and 1913, a very complete record of infectious diseases in London for past years. This investigation showed that the average number of cases of infectious diseases per year in London (say population 50,000) must have been as follows:

Chickenpox	about 500
Measles	about 800
Mumps	about 500
Whooping Cough	about 600

This should be borne in mind when considering the following table of cases of infectious diseases.

Disease.	The year 1914.	Year ending Nov. 30th, 1916, among civilians.
Chickenpox .....	.....	175
Diphtheria	111	127
Measles	2	752
Mumps .....	.....	199
Scarlet Fever.....	20	52
Smallpox.....	60	.....
Tuberculosis.....	18	152
Typhoid Fever	2	17
Whooping Cough .....	.....	349
Poliomyelitis	6	4
Cerebro-spinal Meningitis.....	.....	4
German Measles .....	.....	31
Total	219	1,862

In considering the figures for 1914, it will be well to remember that according to Provincial Reports, London, in 1914, is credited with 64 deaths from tuberculosis while the Board of Health records show only 18 cases reported; with 5 deaths from typhoid fever, while only 2 cases were reported. Thus, with the exception of diphtheria, smallpox and perhaps scarlet fever, far more cases existed than were reported.

These preceding tables show conclusively that the apparent freedom of the city from certain infectious diseases, as compared with the present is entirely fallacious and due to the fact that the existence of infectious diseases in the past was not recognized or reported.

To illustrate:—Suppose the record of rainfall in Canada from the establishment of Government observatories to the present indicates so many inches per year. The absence of records previous to that date would induce no sane man to believe that there was no rain.

THE REPORT.

The chief headway made by the Department in its work with infectious diseases in the city during the last year is that, through educating the public by distributing circulars, etc., it has obtained a great improvement in the reporting of cases of measles, whooping cough and the other so-called milder infectious diseases. Previous to this last year these diseases have received but little attention. In 1914, only two cases of measles were reported and not a single case of whooping cough. The records of previous years show no record of mumps being reported and chickenpox only when it was supposed to be smallpox. The result of this public health education carried on throughout the year has been very encouraging. Unreported cases of measles are rare. Whooping cough seems to be an exception to the complete reporting of cases and in this case our experience seems to indicate that parents fail to recognize the disease. An instance came to our attention where a mother sent her child back to school with a note to the effect that the child had not had an infectious disease, but had simply had a cough with spells of vomiting. When this case was investigated it was found that the history of the case left no doubt as to it being whooping cough that the child had had. Towards the end of the year indications pointed to a fairly complete reporting of whooping cough.

In obtaining more complete reporting of cases the Health Department has received much co-operation from the public school authorities via the nurses and teachers. Especially is this the case in whooping cough. For instance, in November fifty per cent. of the cases brought to our attention were reported from this source. As regards tuberculosis, the reporting of cases has improved somewhat over last year, but even last year was good in this respect. Of course, it cannot be said that all cases are reported. We feel that many of the early cases are still unreported, even where a physician has been called, but yet the situation is promising. The local health department owes much to the London Health Association under the supervision of Dr. D. A. Craig, Superintendent of the Alexandra Sanatorium, for its work in tuberculosis and also for its co-operation with the Health Department. Were it not for this association the work among the tuberculous of London would be badly neglected.

Another advance in the work with infectious diseases in the last year has been to use up-to-date knowledge of preventive medicine to make methods of isolation as lenient as possible, yet not too lenient and to make these methods systematic and not as a township M.O.H. once said at a Public Health Convention, "Handle each case as it arises and as you see fit," which means that in all probability every case was handled differently and some ignored entirely

- Some of the changes made in the year are as follows:—
1. In measles, whooping cough, mumps and chickenpox and any milder infection, no immune contacts were quarantined.
 2. In no case was the breadwinner quarantined except when he himself was the one infected.
 3. In measles the isolation period was reduced from 21 days to 14 days from the date first sick or ten days from the appearance of the rash.

Our records show that these steps were quite justifiable.
For instance:—1. In measles, of 1,383 who were recorded as immune and, therefore, not quarantined; only 11 developed the disease (i.e., 0.8 per cent.). Such instances as the year went by, became rarer because it was learned through experience to judge as to whether or not the evidence of immunity given in each case should be accepted. In whooping cough not a single child who was allowed to attend school because of immunity, while his home was quarantined developed the disease. This is also true of mumps and chickenpox.

The chief benefit of these changes has been to save the immune children the loss of school as was the case under the old system of quarantine.

The infectious diseases (except tuberculosis) among the civilians of London and the soldiers stationed here during the year ending November 30th, 1916, were as follows:

TABLE No. 1

Disease.	Civilians.		Soldiers.	
	Cases	Deaths.	Cases.	Deaths.
Chickenpox	175	.....	3	
Diphtheria	127	16 (a)		
*Measles.....	752	5 (b)	97	
*Mumps	199	1	66	
Scarlet Fever.....	52	2 (c)	10	
Smallpox .....	.....	.....	1	
Typhoid Fever.....	17 (d)	1	2	
Whooping Cough.....	349 (e)	6		
*German Measles	31	.....	94	
Anterior Poliomyelitis.....	4	2		
Cerebro-spinal Meningitis.....	4	5 (f)	2 (g)	1
Total.....	1,710	38	275	1

(a), (b), (c), (d), (e), (f), (g). See notes on the following pages.

Table No. 2 which follows shows the cases and deaths among the civilians of London arranged according to the month of report of occurrence. In tabulating this table all errors in the records during the year have been eliminated as far as known. Only those cases are recorded as diphtheria, which had positive cultures, except in two or three instances where only one culture was obtained (which was negative) because of death on first or second day. Here, as the clinical diagnosis pointed strongly to diphtheria and on account of the death, the case was considered diphtheria. In considering the table it will be well to also consider the notes thereto as they may explain why the number of deaths, especially, may not agree with records elsewhere.

*The records here may be slightly in error as regards the cases of measles, mumps and german measles because the Health Department did not have direct control over these cases.

TABLE NO. 2.

Disease.	Dec.		Jan.		Feb.		Mar.		April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Chickenpox	9	....	30	....	30	....	39	....	10	....	10	....	9	....	24	....	1	....	1	....	5	....	7	....	175	....
Diphtheria	4	....	3	....	2	1	11	2	8	....	....	....	2	....	5	1	3	1	22	4	30	5	37	2	127	16 (a)
Measles	1	....	13	....	31	....	37	....	93	1	219	1	188	3	99	....	55	....	16	....	....	....	....	....	752	5 (b)
Mumps	7	....	52	....	75	....	42	1	14	....	6	....	3	....	....	....	....	....	....	....	....	....	....	....	199	1
Scarlet Fever	2	....	6	....	2	1	5	....	7	....	6	1	8	....	3	....	6	....	1	....	3	....	3	....	52	2 (c)
Smallpox .....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Typhoid Fever .....	....	....	....	....	1	....	6	....	....	....	....	....	1	....	....	....	....	....	5	1	4	....	....	....	(d) 17	1
Whooping Cough .....	....	....	1	....	7	....	7	....	13	1	14	....	9	....	54	....	47	2	52	1	75	2	70	....	349	6 (e)
German Measles .....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	30	....	31	....
Anterior Poliomyelitis .....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	3	1	....	1	....	....	(f) 4	2 ()
Cerebro-spinal Menin.	2	3	....	....	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	(g) 4	5 (g)
Total	25	3	105	....	150	3	147	3	145	2	255	2	220	3	186	1	113	3	100	7	117	9	147	2	1,710	38

See notes (a), (b), (c), (d), (e), (f), (g).

(a) *Diphtheria*.—Included in the number of deaths is a death registered as due to edema of glottis. Here a post mortem revealed the presence of diphtheria bacilli. This death is, therefore, included as due to diphtheria. It occurred in July.

Not included is a death registered by a local physician as due to diphtheria. This was not considered as diphtheria by the Health Department. Cultures from the nose and throat failed to reveal the diphtheria bacillus. Death likely due to a streptococcic infection. This death occurred in October.

(b) *Measles*.—Three of the five deaths (one in April and two in June) were registered as due to pneumonia, no mention as to measles preceding. As our records show that pneumonia complicated measles, these three deaths are included under measles.

(c) *Scarlet Fever*.—A case and death recorded in February was that of an Italian child taken off the train, sick, on its arrival from Italy. There was some doubt as to scarlet fever, but the death occurred before a reliable diagnosis was made. A post mortem failed to shed light as to the disease. The death certificate was filled in giving “scarlet fever (?)” as the cause of death.

(d) *Typhoid fever*.—Ten of the cases (no deaths) occurred in the Hospital for Insane, six in March, four in October.

(e) *Whooping Cough*.—The deaths among children having whooping cough were registered as follows:

Date of Death.	Cause of Death.	Immediate Cause.
April 9.....	Whooping Cough	Whooping Cough.
Aug. 29.....	Whooping Cough	Diarrhœa and vomiting.
Aug. 29.....	Whooping Cough	Diarrhœa, vomiting and burns.
Sept. 4.....	Cholera Infantum	Cholera Infantum.
Sept. 8.....	Gastro-enteritis	Gastro-enteritis.
Sept. 18.....	(No record of death could be found. Our information was obtained by the assistant M.O.H. when he released this family from quarantine.)	
Sept. 29.....	Whooping Cough	Convulsions.
Oct. 20.....	Whooping Cough	Debility.
Oct. 22.....	Whooping Cough (apparently) ...	Convulsions.

To decide which deaths to assign to whooping cough is rather a puzzle and will not be attempted. For instance, which of the four causes, whooping cough, diarrhœa, vomiting or burns given as the cause of one of the deaths occurring August 29th, was really the cause of death. From the above one might consider anywhere from three to nine deaths from whooping cough. The only solution (a very poor one) is to take only those deaths in which the cause of death was registered as whooping cough, (i.e., six deaths which is equally likely to be too high as too low).

(f) *Anterior Poliomyelitis*.—A death occurred in Victoria Hospital from anterior poliomyelitis. The patient was a child from the Muncey Reserve, brought here for treatment. This death is not included in the table, neither is the case.

A case of poliomyelitis came to our attention of a child who had recovered from the acute attack, which occurred in Ailsa Craig, but was not recognized. This child had moved to London with its parents a few days before the case was brought to our attention. This case is not included in the table, because the case (in the acute stage) did not occur in London, and also because at the time the child moved to London the six-weeks' quarantine period had expired.

(g) *Cerebro-Spinal Meningitis*.—One death occurring in December was of a case taken sick before December 1st, 1915. Another death that occurred in October was of a returned soldier (a resident of London) who had the acute attack 18 months previous in England. He had been in civilian clothes for some time and, therefore, was considered as such. Of the four cases that occurred in the year, three died and one completely recovered.

TUBERCULOSIS.

Among the civilians and soldiers who were, previous to enlisting, residents of London, there were reported during the year ending November 30th, 1916, 152 cases of tuberculosis. According to the city death register there occurred 72 deaths in the same period. But included in these deaths are residents of outside places who died in London, where they had come for treatment. Therefore, to be more exact and fair to London, we must exclude deaths of all non-residents (i.e., deaths in hospitals and other institutions of individuals who previous to entering these institutions were not residents of London). Besides this we must include deaths of residents which we are certain died of tuberculosis, but which were registered as due to other causes. This adds two deaths, one in March and one in April. Thus the revised statistics of tuberculosis in London for the year in question is as follows:

Table No. 3.

—	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Total.
Cases	11	7	20	23	18	12	6	13	12	9	9	12	152
Deaths ...	1	2	6	6	6	3	5	9	2	5	4	2	51

OTTAWA.

DR. R. LAW, ACTING M.O.H.

In the absence of Dr. Lomer, Medical Officer of Health, on duty with Sanitary Division of the Army Medical Service at the front, it is my duty to present the Report of the Health Department for the year ending October 31st, 1916.

In doing so, I am glad to be able to report that all members of the staff have worked zealously to the end that we are able to show a decline in deaths from infectious illness and the closing of the year with a handsome surplus, as indicated by the report of Mr. McClymont, Secretary.

In view of this continuation of good work and good fortune, and the difficulty that those on small stationary salaries have to support themselves and dependents under the marked increase in the cost of living, it is regrettable that the small and wellearned increases recommended by your Board could not have been awarded to them. It is to be hoped that the civic finances next year can be so adjusted that we may be able to give them more than the well won praise of "Well done, good and faithful servant."

I have to report a further reduction in the staff, two of our sanitary inspectors, having been dispensed with during the year, Messrs. Proulx and Hudson. Both were efficient workers. Mr. Proulx, after nearly forty years arduous and faithful service, left us to enjoy a well-earned rest, with the best wishes of all members of the staff and the public generally. It is to be hoped that in future more generous arrangements can be made for retiring allowance to old employees—eight hundred dollars being all Inspector Proulx received after his long service.

I attach herewith various tables and the reports of sub-departments.

The tables of births and deaths for the past six years show that this has been a good average year. The total population shows a slight increase over last year.

A gratifying decline is noted in the deaths from pulmonary tuberculosis and diphtheria. The deaths from typhoid, excluding non-residents, are near the irreducible minimum. Scarlet fever, for the first time in many years, has not caused a single death.

We have been fortunately spared any visitation from the much dreaded infantile paralysis, so epidemic in New York this year, with its dread wake of death and deformity.

Of smallpox, as in last year, we have also been entirely free.

The outstanding increases in deaths have been from the acute respiratory illnesses, notably pneumonia, which prevailed in a severe form last winter.

The estimated population is	100,561
Total number of births for 1916	2,542
Birth rate for 1916	24.20 per 1,000
Birth rate for 1915	26.83 per 1,000
Birth rate for 1914	24.92 per 1,000
Birth rate for 1913	26.38 per 1,000
Birth rate for 1912	23.98 per 1,000
Birth rate for 1911	22.83 per 1,000
Total deaths for 1916	1,926
Still births	170
Deaths of non-residents	213
Corrected total deaths	1,543
Death rate	19.15
Corrected average death rate for 1916	15.34 per 1,000
Corrected average death rate for 1915	14.31 per 1,000
Corrected average death rate for 1914	15.26 per 1,000
Corrected average death rate for 1913	15.28 per 1,000
Corrected average death rate for 1912	14.14 per 1,000
Corrected average death rate for 1911	15.86 per 1,000

TUBERCULOSIS.

Pulmonary tuberculosis still holds the premier place in the mortality list from communicable diseases, with 111 deaths. This, however, is 22 less than last year which is an encouraging sign.

In spite of the many years during which the value of fresh air and sunlight in the prevention and cure of tuberculosis has been urged, few seem to realize that the closed and sunless habitation, however elaborate its appointments, provides a passport to general impairment of health with its too frequent sequel, the consumptive's grave.

The great increase in diseases of the respiratory system during the winter months is due more to the debilitating effects of over-heated, unventilated habitations than to the cold air, the common term of cold being a most misleading one in this respect.

When little babies and delicate consumptives can, with great benefit, spend hours each day in the outer air there is no excuse for the stronger ones to weaken themselves by closed housing. If you want to be well this winter spend all the time you can outside in the fresh air and the rest of your time inside in the fresh air.

DIPHTHERIA.

I am glad to be able to report a decided improvement in the diphtheria situation over last year, there being 21 deaths less from this cause.

The 32 deaths occurring this year figure out at four per cent. of all deaths under 15 years, which, according to elaborate statistics presented at the American Public Health Association by the Prudential Life Assurance Company is, the average toll from diphtheria.

When we possess a means so potent in the treatment of diphtheria as antitoxin, which is estimated to save over a quarter of a million lives each year in the civilized world, there is no reason why these deaths should have occurred; and they are more properly chargeable to delay in securing treatment than to diphtheria.—Delays are dangerous.

It is most unjustifiable for any one to undertake the treatment of sore throats or croupy conditions without advice of a physician. Lack of means is no excuse as the Department will see to any unable to pay.

WHOOPING COUGH AND MEASLES.

Much work is being done in looking to the development of a similar means to the treatment of whooping cough, so generally regarded by many as an inevitable ill of childhood, and, therefore, so difficult to control. Nineteen deaths were registered in Ottawa from this distressing disease during the past year.

Ottawa shared in the widespread epidemic of measles so prevalent this year. The general type was mild and the season favorable. There were eight deaths registered from it out of 869 cases reported.

The incidence of these diseases might be generally reduced if the general public would realize that coughs and colds in children are probably infectious and often the forerunner of whooping cough and measles; both of which diseases are more infectious before the development of definite symptoms. The moral is to keep children with coughs and colds away from other children.

TYPHOID FEVER.

Our typhoid fever statistics show a further and pleasing decline. Deducting the cases from outside we find there have been but twelve cases reported with four deaths—a record which few places can equal.

MILK STATION WORK.

The report of Miss Davidson, Superintendent of the Modified Milk Stations, shows the increasing work being done by our nurses in this most important branch of our work. This work should be further aided through the interest aroused by the Better Babies Baby Week, inaugurated so successfully by the ladies of the Victorian Order this year. Most instructive lectures and demonstrations were given and much valuable literature distributed—insistence being placed upon the paramount duty of every mother who is physically able to nurse her child to do so. Failure to do this is robbing many little ones of their only chance of survival.

The total deaths of children under one year were 566, an increase of over 59 over last year. The greater incidence of respiratory diseases during the past winter and the long continued heat of the past summer have contributed to bring this about.

The presence of a large foundling institution in this city to which babies are admitted from the entire district surrounding, many of whom are in a most debilitated condition, contributes largely to this excessive mortality. One hundred and thirty-two deaths were registered here which should, in justice to the mothers of Ottawa, be deducted, leaving an infantile mortality of 434 among our general population, or at the rate of 171 per 1,000 births registered. Even this is yet too high, and is an indication of the great need of the educational work being carried on by the doctors and nurses in charge of the work at the Milk Stations.

The thanks of the Board are due to Drs. Tilley, Beroard, Brunet and Byrne for their services so generously given for the care of the children of the poor mothers coming to the clinics held at the stations.

In conclusion, I beg to thank you, gentlemen, for your hearty co-operation with the staff of the Department in our efforts to advance the interests of public health in our city.

COMMUNICABLE DISEASES REPORTED

1915

1916

[illegible]

SUPERINTENDENT OF ISOLATION HOSPITAL, DR. R. P. HARDMAN.

I have the honor to submit to you a medical report of the Isolation Hospital for the year ending October 31st, 1916.

Number of admissions to hospital	453
Aggregate attendance	9,088
Average number of patients	24.9
Maximum number of patients, October 31st, 1916	40¾
Minimum number of patients, July 19th, 1916	6.
Percentage death rate of hospital	6.6

CONTAGIOUS DISEASES ADMITTED TO HOSPITAL.

Disease.	Admitted.	Discharged.	Deaths.	Death Per cent.
Diphtheria.....	368	344	24	6.5
Scarlet Fever.....	50	50		
Measles	25	25		
Erysipelas.....	2	2		
Other Diseases.....	25	25	4	

Other diseases consist of German measles, chickenpox, tonsilitis, quinsy, broncho-pneumonia, cerebro-spinal meningitis, epidemic, etc. The four deaths referred to were due to broncho-pneumonia.

DIPHTHERIA.

There were twenty-four deaths from diphtheria. Of this number, six were mori-bund on admittance dying within eighteen hours of admission. Five died within forty-eight hours after admittance to hospital. The average dose of antitoxin given was twenty-two thousand units.

Death Incidence with the number of days case remained at home.

Days' Illness at home	1	2	3	4	5	6	7	8	9	10
Deaths		2%	4%	6%	8%					

Thus we find the death rate advancing as the number of days' stay at home in-creases, providing antitoxin is not given immediately. So— a word to the wise.

LARYNGEAL DIPHTHERIA.

This year we had twenty-five cases requiring intubation and five of these died, giving us an enviable record of twenty per cent. This percentage has few equals, as the average per cent. rate for this class of disease is around thirty-six per cent.

SCARLET FEVER..

We admitted twelve cases less this year than last year. No deaths.

NO MIXED INFECTION.

From October 31st, 1914, to October 31st, 1916, we have been free from this trouble. But observation rooms to each ward would relieve all anxiety.

BACTERIOLOGY.

Swabs examined, negative, 1,640; positive, 969.

SWAB STATIONS.

One more station should be added in Ottawa South.

NATIONALITY OF PATIENTS AS ADMITTED TO HOSPITAL.

Canadians	378	Scottish	10
English	22	American	13
Hebrews	13	Polish	5
Irish	2	Australian	2
Italian	3		

CHIEF FOOD INSPECTOR, J. B. HOLLINGSWORTH.

I herewith submit report of the work done by the Dairy and Food Inspection Branch of the Department, for the year ending October 31st, 1916.

RE MILK.

During the year, from 39 milk vendors, 2,605 samples were collected, an increase of 413 over last year. The inspector examines containers and temperature of milk, the sample is then sent to the laboratory for chemical and bacteriological test. Over 98½ per cent. were found up to our standard in butter fat and the bacteriological count runs most favorable. This shows an improvement over last year. One vendor was fined and two required to discontinue selling milk owing to unsatisfactory conditions.

Householders are warned of the need of keeping milk cold, clean and covered, after delivery to them, and also of the importance of prompt return of milk containers in a cleanly condition. It is against the law to retain and use these containers for other purposes as some do. The careless consumer in this way is doing his bit to increase the cost to every one else.

Several herds were tested this year for tuberculosis and only in one instance was a herd found badly affected. This should encourage the dairymen to have more tests made. In one of these herds the only re-acter found was a pure-bred animal bought by an enterprising dairyman at a large price, with the idea of further improving his stock. To protect dairymen against a repetition of such an experience something should be done, as has been done in other countries, to require test of all registered cattle previous to sale.

The dairyman should also be protected against an infection of his herd through the distribution of whey, etc., from cheese and butter factories to which milk from tuberculous herds have ready access. Measures requiring pasteurizing of these have been carried out in many progressive dairy countries with most marked benefit in lessening the spread of tuberculosis.

The milk By-law, proposed some time ago, requires that all milk should come from herds free from tuberculosis or be pasteurized. This, has not, as yet, received the necessary sanction. Efforts are being made to have the Dominion rules so amended as to make this more acceptable to the dairymen.

The experience in many places shows that the extent of tuberculosis is not so marked as many dairymen feel and its elimination not a matter of such difficulty.

With the increasing difficulty in getting needed milk and the more extensive districts inspected for it, Ottawa, like many larger places has arrived at the time where, in order to protect our citizens, the milk must be pasteurized, unless produced from tuberculin-tested herds. Under careful inspection, 70 per cent. is already pasteurized and other leading dairymen are considering installation of pasteurizers. Some tested herds are now successfully supplying milk so that a relatively small percentage would be affected. Of this number, many could readily obtain a free herd, when tested, with a very slight expense—an expense which in the end would really well recompense them as a tuberculous animal seldom gives a sufficient return to justify the trouble of keeping it.

SLAUGHTER HOUSES.

Our slaughter houses in, and on the immediate outskirts of the city, have been regularly inspected. Some improvements have been made, such as providing cooling rooms for meat, proper yards for cattle, some distance from the slaughter house, screens on doors and windows, sound floors, whitewashing the interior of building and the removal daily of all waste.

Five thousand seven hundred and fifty-three pounds of meat were confiscated as unfit for food. Three thousand one hundred and thirteen pounds of this was condemned for being tubercular.

Forty-one calves and fourteen sacks of frozen, boned veal were condemned and sent to burner.

Section 102 of the Public Health Act prohibits the sale of veal under four weeks of age. The Meat and Canned Food Act of the Federal Government sets the age at three

weeks. The legislature, at its last assembly legalized the sale of veal in Ontario at two weeks old, and under the present law the flesh of a two-week old calf can be sold in Ottawa as veal.

RE BREAD, ETC.

Six hundred and seventy-five loaves of bread were confiscated and delivered to the City Charity Officer for distribution.

Two car loads of potatoes, partly decomposed, were sent to the dump last spring, and a quantity of canned goods.

A great deal of attention is being paid by the bakers, confectioners, shop and restaurant tradesmen generally to the elimination of flies, as the general public are well informed of the dangers from these pests around premises where food is prepared or sold.

The question of meat inspection at the time of slaughter is still before us. This cannot be properly dealt with until we have a public abattoir, properly controlled and sufficiently protected by law.

Eighteen ice permits were given last year for proper areas in the Ottawa, Rideau and Gatineau Rivers.

During the year we had sixteen prosecutions and fifteen convictions, with one hundred and forty dollars collected in fines.

In conclusion, I wish to state that the inspectors under my branch of the Department have performed their duties conscientiously and energetically.

CITY BACTERIOLOGIST, J. RACE.

I have the honour to submit to you my report upon the work performed in the Civic Laboratories during the year ending October 31st, 1916.

During the year a total of 12,449 samples have been examined and reported upon as against 12,715 in 1915, and 10,805 in 1914. From the table on this page, showing the nature of the samples submitted, it will be seen that the slight decrease is due to the smaller number of diphtheria swabs received.

Month.	Water.		Milk.		Hypochlorite.	Foods and Drugs.	Diphtheria Swabs.	Sputum.	Widals.	Roadway material.	Miscellaneous.	Total.
	Chemical.	Bacteriological.	Chemical.	Bacteriological.								
1915												
November	9	243	227	216	130	5	792	14	8	8	12	1,664
December	11	245	230	229	125	6	58	12	6	....	17	939
1916												
January	8	240	223	209	133	11	155	16	3	....	23	1,021
February	8	235	196	196	150	3	88	7	7	3	20	913
March	33	261	233	226	162	12	136	19	6	1	19	1,108
April	29	236	181	181	132	9	33	15	10	....	20	846
May	26	276	233	239	104	4	40	14	11	53	19	1,019
June	25	282	176	176	100	1	39	16	3	29	20	867
July	25	245	244	256	100	14	7	14	3	132	27	1,067
August	26	262	228	248	54	16	19	23	7	26	25	934
September	25	265	209	211	90	20	15	13	5	21	31	905
October	25	268	222	251	100	16	142	38	9	18	77	1,166
Total for year	250	3,058	2,602	2,638	1,380	117	1,524	201	78	291	310	12,449

WATER.

The usual tables showing the chemical and bacteriological condition of the raw and treated water have been prepared on the standard forms adopted by the New England Waterworks Association, and may be obtained from me by those interested in this data.

The condition of the river water as regards turbidity and colour has again been favourable; no excessive turbidities occurred during the spring months and the colour

has remained comparatively low throughout the year. It is worthy of note that average colour of the water during the last three years is almost 50 per cent. less than in 1912-1913, the first year during which tests were made. An adequate explanation of this phenomenon cannot be put forward at present, but it is not improbable that it is connected with increased storage on the Upper Ottawa. Whatever the cause may be it has undoubtedly resulted in an improved physical appearance of the supply.

An ample margin of safety has been maintained in the city supply throughout the year, and this, in conjunction with the exercise of constant vigilance over other supplies, has cut the total number of typhoid cases in two. (111 cases, 1915; 55 cases, 1916). When the outside cases, over which the Department can exercise no supervision, are deducted, the reduction is even more remarkable. The cases and deaths which show no clear evidence of having contracted the disease outside the city are as follows:

	Cases.	Deaths.	Loss of vital energy.
1911.....	1,160	76	\$590,000
1912.....	1,300	84	660,000
1913.....	90	14	75,000
1914.....	86	9	56,000
1915.....	47	12	56,000
1916.....	12	4	18,000

Twelve cases and four deaths for a city of 100,000 people is a remarkable record that is almost without parallel on this continent, and one that compares favourably with the best European ones. Among the four deaths is one in which the patient, a foreigner, died before any information could be obtained as to where the disease was contracted.

I have calculated the saving to the city on a monetary basis that this reduction represents, and taking a very conservative estimate of the value of a life at \$3,600, and the cost of a typhoid case at \$275, this must be placed at upwards of \$38,000, as compared with last year.

In addition, a great deal of suffering and misery has been eliminated; humanitarian considerations to which it is impossible to give numerical expression, but which are exceedingly real.

The above results show that the temporary measure of purification by means of hypochlorite under constant scientific control has been an excellent investment to the city, and instead of a fever spot to be avoided at any cost, as Ottawa was regarded at the time of my appointment, it is now absolutely above reproach in this respect.

The outside cases received in the city hospitals for treatment have originated from many sources, but this year has shown a remarkable decrease in the cases from Aylmer and Hull; not a single case has been traced to the latter source since the water treatment was commenced. Smith's Falls and Carleton Place have been the most prolific sources of outside cases, excepting one which will be referred to later, but it is satisfactory to note that Smith's Falls has also installed a chlorine plant and this will, no doubt, have a marked effect on the Ottawa statistics.

WELLS.

Many of the wells in the city continue to be used despite repeated warnings that the water is polluted. Under the present by-law, these cases cannot be adequately dealt with, but amendments are under consideration and will shortly be placed before you for approval. Unless filled in, polluted wells will continue to be used so long as nothing untoward occurs, but these consumers should remember the fate of two families at Masham, P.Q., in 1916, who "went once too oft to the well," with the consequence that almost every member contracted typhoid and no less than eight died. If well users will not protect themselves it is the clear duty of the city to fearlessly exercise its authority. I cannot emphasize too strongly the warning given in my previous reports that the geological formation of Ottawa is exceedingly unfavourable for procuring water of satisfactory quality from wells and that wells should only be driven for industrial purposes.

SPUTUMS AND WIDALS.

The samples of blood received for the Widal typhoid test show a decrease and this can be attributed to the decreased incidence of this disease during the year. The majority of the specimens received were from outside cases in the hospitals.

The number of sputums received again shows an increase but the total is still absurdly small compared with the number of cases of tuberculosis in the city. Last

year I recommended that a blotter be prepared for distribution to the physicians with a short notice printed on it acquainting them with the laboratory facilities placed at their disposal. This, I would again urge upon you, as I am sure that the small outlay required would bring an adequate return. A public health laboratory needs advertising like every other business if the best results are to be secured. If the specimens will not seek the laboratory, the laboratory must seek the specimens.

MILK.

The bacteriological purity of the raw milk supply again shows a decided improvement, the average bacterial count being 181,000 per c.cm., as compared with 226,000 in 1915, and 284,000 in 1914.

The average chemical composition of the farmers' milks is about the same as last year, but 2.2 per cent. were deficient in fat and 10.8 per cent. deficient in total solids, as compared with 0.3 and 2.2 per cent. respectively for last year. These results do not necessarily point to increased sophistication; they are due, in my opinion, to lack of proper mixing in the cans before delivery. Samples have been received containing six per cent. and even as high as 7.8 per cent. of fat and if some customers are receiving milk of this quality, others must receive milk of correspondingly poor quality.

The average composition of the various classes of milk is as follows:

	Fat	Total Solids.	Solids not Fat.	Bacteria per c.cm.
*Farmers' Milk	3.94	12.74	8.80	181,000
Pasteurized Milk	3.84	12.62	8.78	29,000
Nursery Milk	4.16	13.00	8.84	30,800
Certified Milk	3.96	12.67	8.71	8,200

*These figures represent the average of the genuine samples only.

MISCELLANEOUS.

In addition to the bacteriological work for the Board of Health and Waterworks Departments, an increasing amount of chemical work is being undertaken for other branches and thus increasing the usefulness of the laboratories to the Corporation generally. The work received during the past year includes the following:

Board of Works.—Asphalt, sand, stone, and cement.

Board of Control.—Coal.

Police Department.—Beer, liquor, medicated wines, and miscellaneous samples for criminal cases.

Fire Department.—Oil, inflammatory materials, and investigations.

City Auditor.—Soap.

Charity Department.—Coal.

Food Inspector.—Foods for detection of adulteration.

In view of these facts, I think it is only equitable that the Board of Control should be requested to contribute towards the laboratory appropriation and that the proportions paid by the Health and Waterworks Departments should be reduced.

In conclusion, I wish to record my indebtedness to the laboratory staff whose cheerful co-operation and assistance have contributed so largely to the successful and economical administration of the Department.

MISS M. E. DAVIDSON.

Supervisor of Modified Milk Depots.

I have the honour to submit the sixth Annual Report of the Infants' Milk Depots for the year ending October 31st, 1916. We find the work steadily increasing in each station. The Depots are, viz.:

No. 1, 249 Guigues (removed May 1st from 288 St. Patrick Street).

No. 2, 7 Irving Avenue.

No. 3, 298 Booth Street.

Owing to the coolness of the spring, we did not find it necessary to engage extra nurses until July 15th, when Miss Carpenter and Miss Leonard were taken on until October 1st. The continuous heat of July and August we found very hard on the babies, and it was necessary for the nurses to be on duty every Sunday during these

two months. The interest taken by the mothers is shown by the large attendance at each clinic, and desire on their part for the nurses' visits and advice. They are beginning to understand that sore eyes, ears, and other ailments are not a necessary accompaniment to the teething stage, but have been caused by lack of care and knowledge.

We still meet with the same trouble, delay on the part of the mother in reporting the child's illness.

If it were possible to do so, I would advise monthly talks to mothers given at the stations by the doctors, as I feel that the nurses have the mothers now so interested in child-welfare that they would attend in large numbers.

Owing to the advice and instruction of the nurses we find more mothers nursing their infants than formerly. This, with the fact that so many men have enlisted and are thereby able to buy milk for their babies, has lessened the number of milk-tickets given out each week.

During the summer of 1917, I would like to interest people who take ice for the season and ask them, when leaving the city for a vacation, to transfer the delivery of the ice to some poor person with young babies. It might be well to interest the daily papers in this project, as has been done in other cities.

The nurses wish to thank the Board for the car fare given each month.
On October 1st, Madame Desjardins resigned, and Miss Duhamel was appointed in her place.

We wish to thank the doctors for their hearty co-operation during the past year.
I submit the following statistical report for the year, which shows the great increase in the work:

Depot.	Babies treated at station.	Babies seen by Nurse at station.	Visits made by Nurses at homes.	Individual babies seen.	Milk tickets dispensed.		Deaths.
					qts.	pts.	
1.....	634	1,009	3,523	508	1,136	235	20
2.....	819	1,733	4,273	973	1,721	1,005	25
3.....	512	1,565	3,345	818	1,139	2,204	17
Total.	1,965	4,307	11,141	2,299	3,996	3,444	62

Cash to the City Hall, from Barley Flour \$92 50

CITY OF PETERBOROUGH.

DR. C. H. AMYS, M.O.H.

I beg to present to you my report upon the sanitary condition of the Municipality.

During the ten and one-half months past we have been blessed with a freedom from any serious epidemic, as the reports on the following diseases will indicate:—

Measles.—We placarded 314 houses; this represented about 800 cases in all. Four deaths.

This epidemic commenced on November 27th, 1915, and, in spite of cases being promptly reported and isolation enforced, it spread all over the city in a few days.

The general opinion among medical men is that the quarantine for measles is too long; and I trust we will see a change in the near future.

Typhoid Fever.—Four cases; three deaths.

On September 1st was the last case.

Three or all of these cases came from out of town, or had been visiting out of town. It might be well for me to state that with two large hospitals and several public institutions in our midst, inhabited by what might be called a floating population, it is a marvel that we have been free, during the last year, of any serious epidemic.

Typhoid is a water-borne disease, and I would advise the Board to take immediate steps to better our domestic ice supply. If we continue to use, in the house and restaurant, ice cut from the Little Lake, we are certainly courting disaster.

Scarlet Fever.—Nine cases; no deaths.

April 19th gave birth to the last case. Several of these came from one institution where there was quite an outbreak towards the close of last year.

Diphtheria.—Forty-five cases; four deaths.

On October 11th was our last case.

The School Nurse's work, coupled with rigid isolation (Hospital treatment) was, I consider, the chief factor in eliminating this dread disease from our midst.

You will agree with me when I say that, as the School Nurse's work is chiefly, if not entirely, to do with public health, she should be employed by the Board of Health. We could then extend her work to the Separate Schools and Collegiate Institute and Normal School, and if necessary give her an assistant. I trust you will take this matter up with the School Board and Council before next year.

Tuberculosis.—No cases reported as required by law. Fifteen deaths recorded.

Smallpox.—No cases.

Chickenpox.—Three cases. This disease is not reported as required by law.

Erysipelas.—Two cases; no deaths.

Whooping Cough.—Three cases; one death.

Cerebro-Spinal Meningitis.—Three cases; two deaths. We had, I believe, only one case of the epidemic type during the year.

Infantile Paralysis.—No cases.

Before closing I wish to touch on the night soil problem, which is, I believe, causing our City Fathers a certain amount of thought and trouble. There is an axiom, "Tax anything and everything you want to get rid of." Tax, it, I say, and have no scruples about it, because almost every house in Peterborough has sewer and water at its door. These houses should be connected up, and every man, rich and poor, should know he is not taking the full advantage of this city's blessings if he fails to connect up. Sewer connection will make his property more valuable, give him more space, give him and his neighbours purer air, less flies, fewer doctors' bills, and a healthier and happier wife and family.

T. R. COOPER, SANITARY INSPECTOR.

In submitting my first six months' report for your consideration it is somewhat difficult to give a complete statistical record of work performed during that time—from June 6th, 1916, to November, 1916.

Nine hundred and thirty-two calls and inspections of backyards and lanes answered and put right.

Six hundred and fifty-four scavengers' complaints.

Two hundred and ten garbage complaints, about half of which resulted from the employment of strange men; the other half, public fault.

Have made two visits to all slaughter-houses that supply meat to the city of Peterborough, and found them all O.K.

Have visited all milk vendors in the city and found everything in a very sanitary condition.

Have put up and taken down twenty-three diphtheria cards and six measles cards.

Inspected all butcher, fish and fruit shops at least once a week, and found them all willing to do what is right.

I have served ninety-eight Nuisance Notices, and in all cases they have been properly carried out.

Inspected all laundries and bakeries, and found them, all but one or two, in a sanitary condition.

I have caused to be removed and destroyed at the incinerator twenty-five dead animals of all kinds.

Have examined and inspected the banks of the River Otonabee above the Waterworks Dam, and also the river above the dam, twice, and found it in a sanitary condition.

The boarding-houses have been carefully inspected, and I have found very few causes for complaint. Of course, the Italian places are the worst.

I have inspected all eating houses and cafés, and have caused some of them to be put in better sanitary condition.

The foregoing report does not convey an adequate idea of all work done, as a great part of my time for three months was taken up with the scavenging difficulty—obtaining men to take licenses and placing them on routes; trouble with the incinerator man; getting incinerator in working order, and having to stay in my office at the first stage of my time trying to collect money for scavengers' work. Much work has been done in regard to night soil, but there is a great deal still to be done which I hope will be carried out in the coming year.

I must also say that Mr. Miller has given me much assistance which I have been very glad of.

CITY OF ST. CATHARINES.

DR. F. KING, M.O.H.

I beg to submit my Annual Report on the sanitary and other conditions relating to the public health of the city for the past year.

COMMUNICABLE DISEASES.

Of communicable diseases there were reported:

	Cases.	Deaths.
Measles	338	0
Scarlet fever	44	0
Diphtheria	21	4
Typhoid fever	27	2
Tuberculosis	16	21
Mumps	7	0
Chickenpox	5	0
Infantile paralysis	2	0
Infantile paralysis, suspected	1	0
Whooping cough	3	1
Spinal meningitis	2	2
Erysipelas	1	0
Anthrax	1	0
Total	468	30

The outstanding event of the year was the sudden and widely spread epidemic of measles. There were 338 cases recorded, but it is an undoubted fact that many cases were concealed, and others not reported. Little attention is given to this subject. The general public look upon the disease as an incident of childhood and one thankful to be over and done with.

I have observed that in every five to seven years this and other municipalities are visited by an epidemic of measles, more or less extensive, also that it is never satisfactorily controlled by the present or past quarantine regulations, for the probable reason that the quarantine period does not begin early enough. The time to control measles is a few days before the rash appears. The infection is spread through the child coughing and sneezing. The quarantine regulations, often onerous, might safely be modified and the period of exclusion cut short, especially in uncomplicated cases.

Another event of interest was the presence of infantile paralysis. Two undoubted cases were reported, also one suspected; and it appears on record, so I am informed, that one case contracted 20 years ago caused death.

It is worthy to note and creditable to be recorded that in the cases above cited the medical attendant supervised and carried out the most satisfactory precautions to prevent the spread of this dreaded disease, in striking contrast to the negligence brought to the notice of the Board early in the year.

TYPHOID FEVER.

There were 27 cases of typhoid fever recorded during the year. Of these, 25 were in the G. & M. Hospital, 13 were residents of the city, 10 were from the county, and one foreign to city or county; also one suspected case.

Recently it was discovered that seven cases had developed in one house. These had not been reported by the medical attendant until after the fact had become public. The origin of these cases was probably in Buffalo. All are included in the Hospital report.

TUBERCULOSIS.

There were reported 16 cases, with 21 deaths, to the Division Registrar; 25 cases were received into the Consumptive Sanitarium, 10 of which were from the city and 15 from outside places. Five deaths occurred in that institution during the year.

VITAL STATISTICS.

Of the total mortality, 298 from all causes, pneumonia still keeps the first rank with 35 deaths; still and premature births numbered 30 as compared with 43 last year.

Children under one year of age	55
Children between one and five years	16
Children between five and ten years	10
Cancer accounted for	13
Heart disease	9
Old age, also	9

SANITATION.

The spirit of the Public Health Act is to prevent nuisances. Here we can only, as a rule, abate a nuisance after the fact. I again wish to point out that to prevent nuisances a more efficient system of sanitary inspection should be adopted, and I note that the official health records state that the city of Windsor has four (4) permanent sanitary inspectors employed. During the year 7,184 feet of new sewers, with 175 sewer connections, were completed or nearing completion. All houses where contagion had been present were fumigated as far as known.

The satisfactory disposal of garbage is still an unsettled question and should receive the earnest consideration of the Board and City Council in the near future.

Unsanitary, unsightly and offensive manure heaps still exist, even in congested parts of the city. In the absence of a more drastic handling of this question, we hope that the automobile may modify or lessen this form of nuisance. The standard of cleanliness of dairies, stables, cows, and for the handling of milk, has been raised. Clean milk is one of the most important articles of human food, but dirty milk containing manure and other foreign articles is one of the most dangerous. There is, however, a tendency on the part of producers to improve their surroundings, and in time, with advice and encouragement, the conditions will reach those demanded by the large cities.

THE ISOLATION HOSPITAL.

We are still without an up-to-date home for contagious diseases. The institution, however, is well managed and kept remarkably clean.

The conditions presented in the Facer Street district require consideration. Unfortunately the land is low and difficult to drain, but some system of drainage or sewerage is urgently needed and should receive prompt attention.

CITY OF WINDSOR.

DR. G. R. CRUICKSHANK, M.O.H.

I beg to submit my Annual Report for the year November 15th, 1915, to November 15th, 1916.

Perhaps the best measure of our success is the death rate, but this may be quite fallacious, for it may be great owing to the accidental presence of a virulent type of contagious disease or it may be small owing to many causes. For instance, since one-third of the deaths occur in infancy, in a community where there are few births one would expect a lower death rate. During the year ending December 31st, 1914, there were one hundred and twenty-two deaths occurring in infancy, and in the year 1915 there were one hundred and five deaths during this stage of life. But the death rate of 1916 may depend upon constitutions weakened by diseases of twenty years ago, so that the number of deaths is not the only measure of our success or failure, as is well illustrated by our outbreak of infantile paralysis, in which there were no deaths in our diagnosed cases, but fourteen children were crippled for life.

INFANT MORTALITY.

Broadly speaking, one third of our deaths occurred in infancy, one-third from infancy to sixty years of age, and one-third over sixty years. This particularly directs our attention to the health of infants, for not only is the number of deaths appalling, but it is probable that many of the deaths up to sixty years of age are due to constitutions weakened in infancy. The number (twenty-five) of deaths before birth

or immediately after is surprisingly great, and no doubt many of the early deaths are not reported. The cause of this would make a good subject for discussion by the Essex County Medical Association.

In Detroit the Board of Health has a Maternity Clinic where prospective mothers are examined, advised and treated. This is giving good results, but there is at present no apparent prospect for us to secure physicians and nurses for this purpose. For infants who survive birth visiting nurses call at the homes and instruct mothers as to the proper care and feeding of young infants. This has, in Detroit, cut the death rate in half in their worst districts. In Windsor we had temporary nurses during the summer months searching for concealed cases of contagion, and incidentally giving advice to the mothers. This has had a very gratifying result. They found that milk probably good when delivered was so badly used in the homes that it became poisonous, and that infants were smothered with filthy clothing and covered with flies. It is surely possible for us to employ a few nurses to continue this good work.

INFANTILE PARALYSIS.

In Windsor this year we had fourteen cases positively diagnosed, and five suspected cases were quarantined. One of the suspects died. If we compare our population with that of New York it will be seen that our percentage would make three thousand in a city of four million. Although the physicians gave us every assistance, three of our cases were not discovered until after their recovery, and then only when the mothers consulted their family doctor about the persistence of a supposed sprain. The laboratory diagnosis of infantile paralysis is not yet practicable, and it is quite likely that many cases recovered completely and were never diagnosed.

We investigated thoroughly in every case all possibility of contact with dairies, milk dealers, grocers, water, ice cream, visitors, excursions, but were unable to establish in a single instance the source of contagion. Two cases followed a visit to Detroit's popular park, Belle Isle, but at that time there were no cases reported in Detroit. A number of cases in Windsor and bordering towns occurred in the families employed by a large motor factory. The factory was carefully inspected to see if the men were in contact or handled the same goods, or if any of the goods came from infected places, but without result. Moreover, we quarantined the entire families for six weeks.

The only possibilities of contact discovered were:

1. Most of the cases occurred in the families of Ford employees, but it must be remembered that there are three thousand men employed in this plant.
2. One child died after one day's illness of brain fever—cause not determined. We quarantined and disinfected. The father was a foreigner employed by a pavement contractor. The families of two other employees of the same company some ten days later showed infection.

It is remarkable that in no family more than one child was infected. Either many are not susceptible or many are infected mildly. We closed all schools, play-grounds, picnics and theatres to children under ten years of age, and maintained the strictest quarantine. The last quarantine was raised in the middle of September.

SCARLET FEVER.

Twenty-nine cases were reported. No deaths.

SMALLPOX.

Five cases were reported. No deaths.

MEASLES.

Two hundred and sixty-seven cases were reported. One death.

WHOOPIING COUGH.

Three cases were reported. No deaths. Evidently very many cases were not reported.

TYPHOID FEVER.

Thirty-two cases were reported. Four deaths. Physicians are reporting their cases better than before, but our nurses discovered cases that were not reported, and only a small portion of the city was investigated then. That so much typhoid occurs in Windsor is surprising. Either chlorination of water is a failure or the chlorination

is not properly done. I inspected the plant on many occasions, and found, at one time, at 5 a.m., only one-half inch of solution in the tank, and on another date, at 2 a.m., I found the tanks full, the room dark, and not a drop escaping into the water. The caretaker should be arrested for manslaughter. Any method that depends on the watchfulness of man is sure to fail at times. Some mechanical non-failing device should be used, or a man of long-proven faithfulness employed. In the meantime I would urgently recommend that Thomas Hillier, the Sanitary Officer, be offered this post. I found, too, that the hypochloride used varies in strength, at least so far as smell can decide. I would recommend that a lot that seems weak be promptly returned.

TUBERCULOSIS.

Five cases reported and twelve deaths. With a system of nurses this defective reporting would soon be remedied.

Windsor is rapidly filling with beautiful, well appointed homes without provisions for outdoor sleeping porches. Tuberculosis is almost universal; probably seventy-five per cent. of our adult population has been infected at times. The best known treatment for Tuberculosis is the Sanitarium. What is there that a Sanitarium can give that could not be provided by the same doctor at home? Diet, medicine, rest, sunlight, out of doors. Not a single home is built for the wealthy without a sleeping porch. Can it be that this is too costly for a mechanic? Most homes have a porch. Would it add much to the expense to place a door over it instead of a window, so that at some time the completion of a sleeping room would be easy? Before long we will have outdoor school rooms for the subnormal children, and any new home will be out of date without a sleeping porch.

DIPHTHERIA.

One hundred and fifty-three cases and fourteen deaths, with twenty-two carriers, were reported.

Diphtheria is spread chiefly by well children with the living germs in their throats and is a very rare disease during school holidays.

St. Alphonsus School had a very severe visitation, and Dr. Morand, the School Physician had swabs from seventy apparently healthy children sent to the government laboratory. Twenty-two of these were reported as carrying the active living germs in their throats. The school was promptly closed, and no child was allowed back until a swab was taken and the laboratory report pronouncing it free from diphtheria germs was received.

DISINFECTION.

It is now generally recognized that fumigation is insufficient. The patients and exposed should, after swabs have been taken and sent to the laboratory, be properly, bathed, especially their hair, and their clothing should be boiled where possible. The room should be scrubbed and the walls re-papered or whitewashed, rugs disinfected or aired. This can best be supervised by a trained nurse.

NURSES.

The work of the school nurse cannot be overestimated, but the work undertaken is too much for one. It has been found that about seventy-five per cent. of the children on coming to school have diseased teeth, tonsils, adenoids or glands. This should clearly show the wisdom of supervision before coming to school by a well trained nurse. I would earnestly press upon your honourable body the necessity for the appointment of four trained nurses as Sanitary Inspectors, one for each Ward. They could work in the schools as well as in the homes. These and one male inspector, with his motorcycle, would, I believe, save many lives and make the lives of all much more efficient and prolonged.

I would again urge upon you the necessity for an Isolation Hospital. In present conditions the task of maintaining a satisfactory quarantine is almost impossible, besides being very expensive to the city as well as to the unfortunate families who suffer.

MILK.

In spite of the increased cost, this is the best and cheapest food that can be bought to-day, yet if not properly handled it is a most dangerous poison. Milk from a tuber-

cular cow is usually free from tubercle, but the cow dung and stable swarm with them. The cow is covered with them, and the milkers' hands become loaded. From these same hands may come typhoid, diphtheria and all other contagious diseases.

Dr. Bowman has done much to improve the quality in every respect. Pasteurization properly done will destroy disease germs and should be insisted upon in all cases, except, perhaps, certified milk.

Our meat, fruit, vegetables are all carefully watched.

PLUMBING.

The fying of plans, specifications and inspections was continued. The Plumbing Inspector was dismissed by the Council and Inspector Wheeler asked to do the work. Unfortunately this left the Board of Health only one inspector, Hillier, to establish quarantine, see that it was observed, notify the schools and library, furnish necessities, groceries, milk and fuel to the unfortunate as well as to disinfect.

Mr. Hillier is industrious and faithful, but he is about eighty years of age and has no means of transportation, so that during an outbreak of contagion he is overworked. It is to be hoped that the proposed Building Inspector will soon be appointed and Inspector Wheeler returned to his former work.

WOODSTOCK.

DR. A. MACKAY, M.O.H.

I hereby submit my annual report of the Health Department of the City of Woodstock, for the year ending 15th November, 1916.

Number of births during the year, 222.

Number of deaths registered during the year, 147, excluding 15 still and premature births; we have 132 deaths, giving 12 per thousand of the population, and excluding 18 deaths of non-residents who came to the city for treatment, we get a death rate of 10.5 per thousand of population.

Deaths were due to the following causes, viz.:

Still and premature births	15	Pneumonia	12
Bronchitis	2	Uremia	3
Accidents	4	Anemia	4
Heart Disease	19	Congestion of Lungs	3
Old Age	6	Influenza	3
Angina Pectoris	2	Tuberculosis	4
Arteriosclerosis	5	Obstruction of Bowels	13
Paralysis ..	7	Peritonitis	2
Heart Failure	7	Cancer	4
Cerebral Softening	3	Spinal Meningitis	3
Malnutrition	3	Cirrhosis of Liver	3
Whooping Cough	2	Apoplexy	2

and one each of the following: Diphtheria, pulmonary embolism, pulmonary hemorrhage, burn, cerebral tumor, scald, pleurisy, hydrocephalus, stenosis of pylorus, nephritis, hepatitis, cyanosis, albuminuria, infantile diarrhoea, typhoid fever, meningitis, cholera morbus, indigestion, spinal abscess, placental hemorrhage, tetanus, bright's disease, jaundice, concussion of brain, dropsy, cerebral abscess, compression of brain, hematosis. The deaths occurring between the following ages:—

Still and Premature.....	15	From 40 years to 50 years.....	10
Under 2 years.....	14	“ 50 “ to 60 “	15
From 2 years to 5 years.	6	“ 60 “ to 70 “	19
“ 5 “ to 10 “	1	“ 70 “ to 80 “	25
“ 10 “ to 20 “	4	“ 80 “ to 90 “	12
“ 20 “ to 30 “	10	“ 90 “ to 100 “	3
“ 30 “ to 40 “	12	Over 100 “	1

COMMUNICABLE DISEASES.

	1915.		1916.											Total.
	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	
Scarlet Fever.....	2	....	3	....	....	....	....	1	....	....	....	2	....	8
Measles.....	....	2	14	15	62	56	44	8	1	....	....	....	1	203
Diphtheria.....	7	....	....	....	....	....	....	....	....	....	....	....	....	7
Chickenpox .....	....	....	2	2	....	....	....	....	....	2	1	....	2	9
Whooping Cough .....	....	....	....	6	12	....	15	17	1	39	6	4	....	100
Mumps .....	....	....	....	....	....	1	....	1	1	....	1	7	5	16
Tuberculosis .....	....	....	....	....	....	....	....	....	1	....	....	....	....	1
Typhoid Fever .....	....	....	....	....	....	....	....	....	2	1	2	3	....	8
Impetigo Contagiosa .....	....	....	....	....	....	....	....	....	1	....	....	....	....	1
Totals.....	9	2	19	23	74	57	59	27	7	42	10	16	8	353

MILK SUPPLY.

Monthly tests of the milk were made throughout the year. Butter fat was usually above the standard requirement. The sediment test during the early part of the year was not satisfactory, but has been good lately.

The Veterinary Surgeon reported that at his inspection the health of the dairy herds supplying the city milk was quite satisfactory.

The members of the Board visited the dairies supplying milk and found many of them badly kept, and the cooling and bottling rooms in a few cases were not satisfactory.

There are a number of wells still in use in the city, but the Board has stopped the using of a few of them, owing to the impure state of the water.

SANITATION.

There were many complaints by residents along Cedar Creek as to the pollution of the water during the summer. The City Engineer and the Board of Works have been at work removing the cause.

Many earth closets are still in use, although the Board succeeded in removing a number this year.

I would suggest that the City By-law be amended by extending the area in which outside closets shall be prohibited, said area to include all streets supplied with sanitary sewers.

I thank the chairman and members of the Board for their able and earnest co-operation in carrying on the work of the Health Department.

RENFREW.

DR. J. J. McCANN, M.O.H.

I have the honour to submit to you the report of the sanitary condition of the town and the Health Department for the year ending November 30th, 1916, it being a review of the work done during the year and a few suggestions for the future.

There have been reported during the year 136 cases of measles with 3 deaths from resultant broncho-pneumonia, 2 cases chickenpox, 15 cases of mumps, 1 case scarlet

fever with one death, 9 cases of typhoid fever with one death, 4 cases of whooping cough, and 20 cases of diphtheria with 3 deaths. There was no smallpox during the year. Six of the typhoid cases were from out of town and were brought to the hospital for treatment. There were in all, 186 cases of communicable disease—a marked increase over recent years, thus necessitating increased work and expense.

Forty-one cases of communicable diseases were taken care of in the Isolation Hospital. During the measles epidemic the upstairs of the old town hall on Hall Street was equipped and put into service as an auxiliary Isolation Hospital. The Isolation Hospital Pest House and equipment are in good condition and the problem of supplying nursing and supervision, having been taken up by the Board and Council, is now nearing a solution.

Diagnostic outfits as supplied by the Provincial Board of Health have been distributed to the local physicians, and a supply of antitoxins, serums, etc., is kept on hand and supplied free of charge.

During the year there have been 136 births and 82 deaths.

The chemical treatment of the water supply is still carried on, and analysis at various intervals showed it to be satisfactory.

A number of complaints *re* nuisances have been investigated and remedied and on one occasion over 300 pounds of meat that was unfit for human consumption was ordered to be disposed of. A prosecution of the vendor in this instance followed, but a conviction was not registered.

There are altogether too many outdoor closets, the number increasing considerably this year. The scavenger system is entirely inadequate to the needs of the town, and I would urge again, as in my last report, that some means be taken to either urge or compel property owners to make sewer connection when such is easily accessible. A garbage collection is now under consideration.

Extension of water and sewer systems to the newer parts of the town should be made without delay. The District Officer of Health, Dr. Maloney, lately made an inspection of the town, and although his report is not yet to hand he intimated that the health and sanitary conditions in Renfrew were entirely satisfactory.

I wish to thank the members of the Board, Secretary and Sanitary Inspector for their assistance and co-operation during the year.

Forty-Ninth Annual Report

OF THE

INSPECTORS OF PRISONS AND PUBLIC CHARITIES

UPON THE

Hospitals for the Insane

OF THE

PROVINCE OF ONTARIO

Being for the Year ending 31st October

1916

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO



TORONTO:

Printed and Published by A. T. WILGRESS, Printer to the King's Most Excellent Majesty

1917

Printed by
WILLIAM BRIGGS,
Cor. Queen & John Sts
Toronto.

PARLIAMENT BUILDINGS,

TORONTO, March 14th, 1917.

*To His Honour JOHN STRATHEARN HENDRIE, C.V.O.,
Lieutenant-Governor of the Province of Ontario.*

MAY IT PLEASE YOUR HONOUR,

I beg to submit herewith the Forty-ninth Annual Report upon the Hospitals for the Insane of Ontario, being for the official year ending on the 31st October, 1916.

I have the honour to be,

Your Honour's most obedient servant,

WM. DAVID McPHERSON,

Provincial Secretary.

OFFICE OF THE
INSPECTOR OF PRISONS AND PUBLIC CHARITIES, ONTARIO.
PARLIAMENT BUILDINGS,

TORONTO, March 14th, 1917.

SIR,—We have the honour to transmit herewith, to be presented to His Honour the Lieutenant-Governor, the Forty-ninth Annual Report upon the Hospitals for the Insane of Ontario, being for the official year ending 31st October, 1916.

We have the honour to be, Sir,

Your obedient servants,

W. W. DUNLOP,
EDWIN R. ROGERS,

Inspectors.

THE HONOURABLE WILLIAM DAVID MCPHERSON, ESQ., K.C., M.P.P.,
Provincial Secretary of the Province of Ontario, Toronto.

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EDWIN ROBERT ROGERS

EDWIN ROBERT ROGERS.

Since the compilation of this report, Inspector E. R. Rogers died on the evening of April 20th, at his home in Toronto. For many months Mr. Rogers had suffered much, and his death was not unexpected, although he continued his active work till the month of January last.

He was born in the year 1859 at the City of Peterborough, being a son of the late Lieut.-Col. Robert D. Rogers. Early in life he moved to Toronto and engaged in the hardware business. Later on when the Canadian West attracted so many, Mr. Rogers located at Calgary, and for ten years held the position of Supreme Court Clerk in that town. In 1898 he returned to Ontario, and again took up the hardware business in West Toronto. In the Spring of 1905 he was appointed License Inspector for West York, and rendered good service to the community in that capacity. In September, 1905, he received the appointment of Inspector of Prisons and Public Charities, which he held to the date of his death. His mercantile experience was of practical value to the Province, especially in the mechanical departments of the Public Institutions, and qualified him for his special duties as Purchasing Agent.

Throughout his life and wherever located, Mr. Rogers took an active part in the movements of the day. He was an active churchman and a member of the Masonic, Forestric and Orange Societies. Notwithstanding his public interests, Mr. Rogers was a man very much attached to his home, and the death of his only son, Capt. Allan Rogers, at the Dardanelles Campaign, was a blow from which he never completely recovered.

Mr. Rogers is survived by his wife and two daughters, Miss Bessie and Miss Rita.

Mr. Rogers was a moralist and a humanitarian, and throughout his twelve years of public service he diffused these qualities into all his work. He will be remembered as a man who waived aside all technical and minor considerations and fought for what was fair play irrespective of the social or privileged standing of the applicant. It was these human qualities that endeared him to his friends and disarmed his enemies, for no one could know him without feeling that he was a friend to all mankind.

REPORT.

Of Edwin R. Rogers and W. W. Dunlop, Inspectors of Prisons and Public Charities for the year ending October 31st, 1917.

GENERAL.

On the 31st October, 1917, exclusive of Insane patients in the Homewood Sanitarium at Guelph, there were in the Hospitals for the Insane of Ontario 6,170 insane persons divided as follows:

Males	2,991
Females	3,179
	<hr/>
	6,170

The net increase in the population for the year was 130.

MOVEMENTS OF PATIENTS.

The daily average number of patients in the Provincial Hospitals for the Insane during the year was 6,197, an increase of 224.

The total number of admissions was 1,414, an increase of 110.

The total number of deaths was 490, a decrease of 25.

The total number of discharges was 679, an increase of 45.

REVENUE.

	1914.	1915.
From paying patients.....	\$225,178.83	\$223,196.10
From farm and miscellaneous	4,523.65	15,582.46
	<hr/>	<hr/>
	\$229,702.48	\$238,778.56

An increase for 1915 of \$9,076.08.

Collection from the municipalities under the provisions of 6 Edward VII, Chap. 8, as follows:—

1914.	1915.
\$124,443.10	\$127,563.70
Making a total increase of.....	\$12,196.68

DEPORTATIONS.

During the year ending October 31, 1916, 138 persons have been deported.

Number of Insane	21
Number of Criminals	90
Number likely to become a public charge.....	27

Owing to the war, deportation cannot be made to several European countries, which explains a decrease.

Needed improvements have been made in all the Hospitals.

Brockville—during the year the new admission Hospital was opened, the largest part of the equipment and furniture being manufactured at the Ontario Reformatory, Guelph. An electrical plant was installed and light used is entirely from that service.

Hamilton—The fire in Orchard House, which took place April 23rd, proved a considerable loss. It has been re-constructed, and will now be in every respect an “up-to-date” section of the Hospital, giving increased accommodation.

London—the assembly hall was completed and has proved of great benefit by affording recreation and instruction for the patients.

The steam heating plant was entirely renovated, being a great advantage both in comfort and economy.

Mimico—the North farm and garden has been extensively drained, which will improve production.

RECEPTION HOSPITAL.

Admissions:	
Male	286
Female	258
	<hr/>
	544
Discharged	252
Died	9
Transferred	246
In residence	37
	<hr/>
	544

W. W. DUNLOP,
EDWIN R. ROGERS,
Inspectors.

TABLE
Showing movements of patients in the Hospital

	Brockville Hospital.			Hamilton Hospital.			Kingston Hospital.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Capacity of Hospital.....	386	378	764	656	639	1,295	311	268	579
In Residence, Oct. 31st, 1915..	371	386	757	668	628	1,296	309	252	561
Admitted during year 1916:—									
By Warrant	1	1	2	84	29	113	6	4	10
By Medical Certificate...	110	101	111	65	97	162	63	61	124
Voluntary.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total number under treatment during year.....	482	488	970	817	754	1,571	378	317	695
Discharges during year:—									
As recovered.....	27	22	49	30	18	48	37	23	60
As improved.....	23	28	51	40	35	75	5	7	12
As unimproved.....	5	4	9	3	2	5	2	2	4
As not insane.....	.....	.....	.....	.....	.....	.....	2	.....	2
Total number discharged during year	55	54	106	73	55	128	46	32	78
Died	29	32	61	50	61	111	19	22	41
Deported	3	1	4	3	.....	3	.....	1	1
Eloped	12	.....	12	8	.....	8	8	.....	8
Transferred .....	.....	.....	.....	1	.....	1	1	.....	1
Total number admitted since opening of Hospital....	1,651	1,613	3,264	3,523	3,391	6,914	2,887	2,453	5,340
Total number discharged since opening of Hospital....	612	683	1,295	1,328	1,483	2,811	1,326	1,171	2,497
Total number died since opening of Hospital.....	553	444	997	1,131	1,006	2,137	909	714	1,623
Total number deported since opening of Hospital....	13	8	21	50	8	58	10	4	14
Total number eloped since opening of Hospital....	63	2	65	121	9	130	93	1	94
Total number transferr'd since opening of Hospital....	27	75	107	211	247	458	245	301	546
Total remaining in Hospital, Oct. 31st, 1916.....	383	401	784	682	638	1,320	304	262	566
Number of applications on fyle	8	7	15	5	9	14	1	2	3
Daily average population	384	408	792	683	649	1,332	311	252	563
Collective days' stay of all patients in residence during year. }	12,234	12,872	25,106	250,259	235,562	485,821	113,784	92,231	206,015

There are in residence in Whitby Hospital for Insane 114 males and 154 female ; Total 268 patients, not included in above tables.

No. 1.

for the year ending October 31st, 1916.

London Hospital.			Mimico Hospital.			Penetang Hospital.			Toronto Hospital.			Totals.		
Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
511	555	1,066	340	320	660	166	203	369	426	426	852	2,796	2,789	5,585
544	608	1,152	350	334	684	164	204	368	518	544	1,062	2,924	2,956	5,880
30	8	38	51	19	70	15	6	21	58	18	76	245	85	330
82	98	180	30	56	86	1	5	6	142	173	315	493	591	1,084
.....
656	714	1,270	431	409	840	180	215	395	718	735	1,453	3,662	3,362	7,294
35	28	63	25	15	40	.....	.....	.....	30	59	89	184	165	349
17	32	49	17	17	34	.....	.....	.....	36	38	74	138	157	295
3	3	6	1	.....	1	.....	.....	.....	6	.....	6	20	11	31
.....	.....	.....	1	.....	1	.....	.....	.....	1	.....	1	4	.....	4
55	63	118	44	32	76	.....	.....	.....	73	97	170	346	333	679
32	44	76	25	23	48	14	17	31	71	49	120	240	248	488
2	.....	2	2	.....	2	.....	.....	.....	2	4	6	12	6	18
3	.....	3	5	.....	5	1	.....	1	4	2	6	41	2	43
.....	.....	.....	16	15	31	.....	.....	.....	128	3	131	146	18	164
4,001	3,682	7,683	1,862	1,705	3,567	305	362	667	6,591	6,330	12,921	20,820	19,861	40,681
1,719	1,676	3,395	621	561	1,182	17	22	39	3,251	3,397	6,648	8,874	9,001	17,875
1,317	1,135	2,452	542	462	1,004	92	118	210	1,804	1,459	3,263	6,348	5,456	11,804
15	4	19	46	9	55	9	.....	9	113	47	160	298	33	331
140	16	156	48	1	49	10	.....	10	157	26	183	632	55	687
246	244	490	266	333	599	12	24	36	826	821	1,647	1,662	1,705	3,367
564	607	1,171	339	339	678	165	198	363	440	580	1,020	2,877	3,025	5,902
2	8	10	21	19	40	.....	.....	.....	12	6	18	49	51	100
551	598	1,149	349	339	688	163	201	364	495	546	1,041	2,936	2,993	5,929
201,877	218,848	420,725	127,479	123,568	251,047	59,690	73,392	133,082	180,675	199,290	379,965	945,998	955,763	1,901,761

TABLE No. 2.

Showing social state and religion of patients admitted during the year and since the opening of the Hospital.

—	Admissions of Year.	In residence.	Admissions since opening.
SOCIAL STATE.			
Single.....	683	3,326	19,810
Married.....	625	2,256	20,036
Widowed.....	101	297	752
Divorced.....	2	2	11
Separated.....	3	4	20
Unascertained.....		17	52
Total.....	1,414	5,902	40,681
RELIGION.			
Baptists.....	55	273	1,726
Congregationalists.....	6	39	322
Church of England.....	276	1,144	8,831
Methodists.....	298	1,267	8,997
Presbyterians.....	265	1,034	7,946
Roman Catholics.....	307	1,353	8,588
Other Denominations.....	156	553	2,893
Unascertained.....	51	239	1,378
Totals.....	1,414	5,902	40,681

TABLE No. 3.

Showing nativity of patients admitted during the year and since the opening of the Hospital.

Nativity.	Admissions of Year.	Admissions since opening.
Totals born in Canada.....	920	24,452
Armenia	2	3
Assyria	1	15
Austria	17	76
Australia		4
Belgium.....	1	9
Bulgaria	1	8
China.....	1	9
Denmark.....	207	5,288
England	4	37
France.....	2	59
Finland	4	10
Galicia.....	13	271
Germany.....		4
Greece	1	6
Holland	1	10
Hungary	54	5,234
Ireland.....	18	88
Italy.....		
Japan	1	10
Macedonia.....	1	224
Other British Possessions	1	17
Norway.....	1	13
Roumania	42	204
Russia	60	2,538
Scotland		8
South America		9
Switzerland	5	52
Sweden	5	11
Turkey.....	29	1,067
United States		16
West Indies	22	929
Unascertained and other countries		
Totals	1,414	40,681

TABLE No. 4.

Showing the occupation of those admitted during the year and since the opening of the Hospital.

Occupation.	Brockville Hospital.	Hamilton Hospital.	Kingston Hospital.	London Hospital.	Mimico Hospital.	Penetanguishene Hospital.	Toronto Hospital.	Admitted this year.	Since opening.
Professional :— Clergy, Military and Naval Officers, Physicians, Lawyers, Architects, Artists, Authors, Civil Engineers, Surveyors, etc.	3	10	17	2	4	....	5	41	670
Commercial :— Bankers, Merchants, Accountants, Clerks, Salesmen. Stenographers, Typewriters, etc	24	18	4	11	8	....	35	100	2,061
Agricultural and Pastoral :— Farmers, Gardeners, Stock Men, etc	20	27	20	42	22	2	11	144	6,081
Mechanics at Outdoor Vocations :— Railway and Stationary Engineers, Blacksmiths, Carpenters, Engine Fitters, Sawyers, Painters, Police, etc	9	17	4	20	7	1	30	88	1,991
Mechanics, etc., at Sedentary Vocations :— Shoemakers, Bookbinders, Compositors, Weavers, Tailors, Seamstresses, Bakers, Factory Workers, etc	11	22	4	18	6	....	25	86	2,562
Domestic Service :— Waiters, Cooks, Servants, etc	27	5	10	13	7	2	32	96	3,922
Education and Higher Domestic Duties :— Governesses, Teachers, Students, Housekeepers, Nurses, etc	76	103	45	64	55	6	91	440	12,113
Miners, Marine Engineers, Railway Employees, Seamen, etc	4	1	1	1	7	....	24	38	427
Laborers	32	44	12	23	28	13	63	215	5,790
No Occupation	4	18	7	22	11	....	47	109	2,561
Unascertained	3	10	10	2	1	3	28	57	2,503
Totals	213	275	134	218	156	27	391	1,414	40,681

TABLE No. 5.

Showing the Counties and Districts from which patients have been admitted during the year ending October 31st, 1916, and the Hospitals they were assigned to.

Counties and Districts.	Number received under warrant process.	Number received from private houses by medical certificates.	Total number received from respective counties during the year.	Assigned to Brockville Hospital.	Assigned to Hamilton Hospital.	Assigned to Kingston Hospital.	Assigned to London Hospital.	Assigned to Mimico Hospital.	Assigned to Penetang Hospital.	Assigned to Toronto Hospital.
Algoma District.....	15	11	26	.....	8	.....	1	13	4	....
Brant .....	.....	21	21	.....	20	.....	1	.....	.....	.....
Bruce	10	9	19	.....	.....	.....	19	.....	.....	.....
Carleton	1	76	77	75	.....	2	.....	.....	.....	.....
Dufferin	1	3	4	.....	3	.....	.....	.....	1	.....
Dundas .....	.....	10	10	10	.....	.....	.....	.....	.....	.....
Durham	1	6	7	.....	1	6	.....	1	.....	.....
Elgin	1	22	23	.....	.....	.....	22	.....	.....	.....
Essex	4	24	28	.....	.....	.....	28	.....	.....	.....
Frontenac	2	28	30	1	.....	29	.....	.....	.....	.....
Glengarry .....	.....	13	13	13	.....	.....	.....	.....	.....	.....
Grenville .....	.....	13	13	13	.....	.....	.....	.....	.....	.....
Grey .....	.....	18	18	.....	18	.....	.....	.....	.....	.....
Haldimand .....	.....	11	11	.....	11	.....	.....	.....	.....	.....
Halton .....	.....	8	8	.....	8	.....	.....	.....	.....	.....
Hastings	1	20	21	.....	.....	21	.....	.....	.....	.....
Huron	7	12	19	.....	.....	.....	19	.....	.....	.....
Kent	1	19	20	.....	.....	.....	20	.....	.....	.....
Kenora .....	.....	.....	.....	.....	.....	.....	22	.....	.....	.....
Lambton	2	21	23	.....	.....	1	.....	.....	.....	.....
Lanark .....	.....	22	22	21	.....	1	.....	.....	.....	.....
Leeds .....	.....	41	41	37	.....	4	.....	.....	.....	.....
Lennox and Addington	1	40	10	.....	.....	9	.....	.....	.....	1
Lincoln .....	.....	7	7	.....	6	.....	.....	1	.....	.....
Manitoulin	1	.....	1	.....	.....	.....	.....	1	.....	.....
Middlesex	9	40	49	1	.....	.....	48	.....	.....	.....
Muskoka District	2	5	7	.....	.....	.....	.....	7	.....	.....
Nipissing District	25	5	30	.....	.....	1	.....	29	5	.....
Norfolk .....	.....	12	12	.....	11	.....	.....	.....	.....	.....
Northumberland	2	10	12	.....	.....	11	1	.....	.....	1
Ontario	10	13	23	1	.....	1	.....	19	.....	2
Oxford	2	8	10	.....	1	.....	9	.....	.....	.....
Parry Sound District	2	6	8	.....	.....	.....	.....	8	.....	.....
Peel .....	.....	11	11	.....	1	.....	1	8	.....	1
Perth	2	19	21	.....	.....	.....	21	.....	.....	.....
Peterborough	5	14	19	.....	2	4	.....	13	.....	.....
Prescott .....	.....	8	8	8	.....	.....	.....	.....	.....	.....
Prince Edward .....	.....	5	5	.....	.....	4	.....	.....	.....	1
Rainy River District	6	.....	6	.....	.....	.....	.....	4	2	.....
Renfrew .....	.....	23	23	5	.....	18	.....	.....	.....	.....
Russell .....	.....	5	5	5	.....	.....	.....	.....	.....	.....
Simcoe	5	26	31	.....	3	.....	.....	22	6	.....
Sudbury .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stormont	1	20	21	21	.....	.....	.....	.....	.....	.....
Temiskaming .....	.....	2	2	.....	2	.....	.....	.....	.....	.....
Thunder Bay District	14	1	15	.....	.....	.....	.....	9	6	.....
Victoria and Haliburton	4	14	18	.....	.....	1	.....	10	.....	.....
Waterloo .....	.....	28	28	.....	26	.....	1	.....	.....	1
Welland .....	.....	17	17	.....	16	.....	.....	1	.....	.....
Wellington .....	.....	23	23	.....	20	.....	2	1	.....	.....
Wentworth .....	.....	115	115	.....	115	.....	.....	.....	.....	.....
York	79	321	400	1	2	1	9	.....	3	383
Unascertained	1	23	24	1	1	20	2	.....	.....	1
Totals	217	1,197	1,414	213	275	134	118	156	27	391

TABLE No. 5a.

Showing the counties and districts from which the entire number of patients admitted to the Hospitals have been received, including the admissions of the present year; also the counties and districts from which the patients remaining in residence the 31st October, 1916, were originally admitted.

Counties and Districts.	Admissions of the year.	Total admissions.	Patients in residence 31st October, 1916.						
			Brockville Hospital.	Hamilton Hospital.	Kingston Hospital.	London Hospital.	Mimico Hospital.	Penetang Hospital.	Toronto Hospital.
Algoma District.....	26	286	....	14	....	2	38	19	8
Brant	21	620	....	93	....	6	2	2	2
Bruce.....	19	638	1	4	....	109	1	4	3
Carleton	77	1,498	250	2	38	....	1	3	1
Dufferin.....	4	169	....	29	....	....	2	3	2
Dundas	10	284	17	....	2	....	2	....	....
Durham	7	560	2	1	10	....	8	....	8
Elgin.....	23	654	....	2	....	....	1	3	2
Essex.....	28	604	3	3	....	86	....	1	1
Frontenac.....	30	1,427	9	9	119	108	1	4	1
Glengarry	13	363	36	....	10	....	....	....	....
Grenville	13	423	43	2	2	....	....	....	1
Grey	18	784	....	114	1	5	8	9	2
Haldimand.....	11	398	1	53	....	1	1	....	....
Halton	8	427	1	40	....	1	3	....	2
Hastings	21	930	9	....	88	1	1	3	2
Huron.....	19	942	2	2	....	115	....	3	6
Kent	20	673	2	2	....	102	1	....	....
Kenora.....	....	1	....	1	....	....	....	....	....
Lambton.....	23	881	3	2	1	110	....	1	....
Lanark	22	705	72	....	13	....	....	1	....
Leeds	41	701	110	1	11	....	....	1	1
Lennox and Addington.....	10	489	3	....	39	....	....	3	2
Lincoln	7	583	1	50	....	....	2	....	....
Manitoulin.....	1	16	2	....	....	....	8	....	....
Middlesex.....	49	2,228	....	4	1	285	3	3	1
Muskoka District.....	7	193	....	4	....	....	15	12	2
Nipissing District.....	30	287	1	9	2	....	70	8	1
Norfolk.....	12	432	....	53	1	....	....	2	....
Northumberland	12	801	3	2	68	....	3	8	10
Ontario.....	23	875	1	7	2	....	59	19	15
Oxford.	10	757	1	6	....	87	2	2	2
Parry Sound District	8	139	....	4	....	....	30	3	3
Peel	11	515	1	8	....	....	36	4	6
Perth.....	21	786	3	7	....	107	2	1	....
Peterborough	19	594	1	1	6	....	64	6	6
Prescott.....	8	325	55	2	3	....	....	2	....
Prince Edward.....	5	293	....	....	34	....	1	....	2
Rainy River District.....	6	85	....	2	....	....	13	8	....
Renfrew	23	567	13	....	69	....	....	3	1
Russell.....	5	136	38	1	1	....	....	....	....
Simcoe	31	1,228	2	23	....	5	86	69	10
Sudbury .....	....	5	....	4	....	....	....	....	....
Stormont	21	475	65	1	4	....	....	1	1
Temiskaming.....	2	3	1	3	1	....	....	....	....
Thunder Bay District.....	15	98	2	8	....	3	31	15	2
Victoria and Haliburton	18	727	....	2	6	....	60	8	5
Waterloo	28	803	....	129	....	1	1	1	8
Welland.....	17	571	2	82	2	....	2	1	4
Wellington	23	997	....	128	....	2	2	5	4
Wentworth	115	2,427	3	356	4	3	2	7	5
York	400	8,924	23	42	12	8	115	101	884
Unascertained.....	24	573	2	7	16	24	1	14	4
New Brunswick.....	....	2	....	1	....	....	....	....	....
United States.....	....	1	....	....	....	....	....	....	....
Totals.....	1,414	40,681	784	1,320	566	1,171	678	363	1,020

TABLE NO. 6.

Showing the assigned causes of insanity in the cases admitted during year.

Causes.	Men.	Women.	Total.	Inherited Predisposition.			Un-ascertained.
				Men.	Women.	Total.	
MORAL.							
Adverse Conditions (such as loss of friends, business troubles, etc.).....	31	37	68	7	11	18	24
Mental Strain, Worry and Overwork (not included in above).....	51	82	133	22	28	50	61
Religious Excitement	5	8	13	.....	.....	.....	11
Love Affairs, including seduction	5	16	21	1	5	6	13
Fright and Nervous Shock	11	19	30	3	4	7	15
PHYSICAL.							
Alcoholism	72	15	87	7	2	9	31
Sexual Excess	5	.....	5	.....	.....	.....	2
Venereal Diseases	43	7	50	2	2	4	5
Masturbation	10	.....	10	.....	.....	.....	6
Insolation.....	1	.....	1	.....	.....	.....	1
Accident or Injury	9	3	12	2	.....	2	8
Pregnancy.....	.....	2	2	.....	.....	.....	2
Parturition and Puerperium .....	.....	10	10	.....	2	2	3
Lactation.....	.....	2	2	.....	.....	.....	.....
Climacteric Period .....	.....	25	25	.....	10	10	16
Fevers	1	.....	1	.....	.....	.....	1
Privation and Overwork	10	12	22	5	4	9	12
Epilepsy	27	16	43	4	4	8	25
Other Convulsive Diseases .....	.....	.....	.....	.....	.....	.....	.....
Diseases of Brain and Skull.....	1	3	4	.....	1	1	3
Senility	46	40	86	6	5	11	27
Exophthalmic Goitre .....	.....	1	1	.....	.....	.....	1
Epidemic Influenza	2	3	5	.....	.....	.....	5
Abuse of Drugs.....	5	5	10	1	3	4	3
Loss of Special Sense.....	.....	.....	.....	.....	.....	.....	.....
Uræmia	1	1	1	.....	.....	.....	1
Other Auto-infection.....	.....	1	1	.....	.....	.....	.....
Other Bodily Diseases	17	21	38	6	8	14	19
HEREDITARY.							
Congenital Defect	36	48	84	31	53	84	16
Unascertained	345	399	744	304	258	562	301
Not Insane	4	.....	4	.....	.....	.....	1
Totals.....	738	676	1,414	401	400	801	613

TABLE No. 7.

Showing hereditary tendency to insanity in patients admitted during the year.

	Admitted During Year.		
	Male.	Female.	Total.
Paternal Branch.....	62	52	114
Maternal Branch.....	38	78	116
Paternal and Maternal Branches.....	8	9	17
Collateral Branches.....	31	47	78
No hereditary tendency.....	239	211	450
Unascertained.....	358	279	637
Not insane.....	2	.....	2
Totals.....	738	676	1,414

TABLE No. 8.

Showing summary of probational discharges during the year.

	Male.	Female.	Total.
Number Granted Probational Discharge.....	349	417	766
Discharged, Recovered while on Probation.....	111	128	239
" Improved " " 	78	110	188
" Unimproved " " 	4	2	6
Died..... " " 	1	.....	1
Returned to Hospital.....	77	85	162
Absent on Probation on October 31st, 1916.....	78	92	170

TABLE NO. 9.

Showing the causes of death of patients who died during the year ending October 31st, 1916.

Cause of Death.	Brockville Hospital.	Hamilton Hospital.	Kingston Hospital.	London Hospital.	Mimico Hospital.	Penetang Hospital.	Toronto Hospital.	Total.
Specific Infectious Diseases:—								
Typhoid Fever		1				1		2
Influenza	2			1			1	4
Cerebro-spinal Meningitis								
Diphtheria	1	1		1	1	1		5
Erysipelas		1	1	1		1	1	5
Septicæmia		9				1		10
Dysentery								
Syphilis	11	13	12	9	11	8	7	71
Tuberculosis								
Toxemia								
Jaundice								
Constitutional Diseases:—								
Rheumatism								
Arthritis Deformas						1		2
Diabetes Mellitus		1						
Diseases of the Digestive System:—								
Mouth, salivary glands								
Pharynx								
Tonsils				1				1
Œsophagus								
Enteritis					2			2
Stomach								
Diseases of the Intestines:—			1					1
Diseases of the Liver		1	2				3	6
Diseases of the Pancreas								
Diseases of the Peritoneum	2	1		5				8
Intestinal obstruction								
Diseases of the Respiratory System:—								
Diseases of the Nose and Larynx								
“ “ Bronchi	2		9					11
“ “ Lungs	4	10	3	14	2	5		38
“ “ Pleura		1					4	5
Diseases of the Circulatory System:—								
Diseases of the Pericardium								
“ “ Heart	10	10	4	3	5	3	13	48
Arterio-sclerosis	8			7	1	1	2	19
Aneurism		1						1
Diseases of the Blood and Ductless Glands:—								
Anæmia						1	1	2
Pernicious Anæmia		3	1	1				5
Leucæmia								
Exophthalmic Goitre								
Diseases of the Genito-Urinary System	1	2			2	2	2	9
Carried forward	41	55	33	43	24	25	34	255

TABLE No. 9—Continued.

Showing the causes of death of patients who died during the year ending October 31st, 1916.

Cause of Death.	Brockville Hospital.	Hamilton Hospital.	Kingston Hospital.	London Hospital.	Mimico Hospital.	Penetang Hospital.	Toronto Hospital.	Total.
<i>Brought forward</i>	41	55	33	43	24	25	34	255
Diseases of the Nervous System:—								
Diseases of the Nerves.....		2						2
“ “ Spinal Cord					1			1
“ “ Meninges.....		1						1
Organic Diseases of the Brain, (Tumor, Abscess, Embolism, Throm- bosis, Hemorrhage, and other gross lesions)	1	2	4	4	2	1		14
Functional Nervous Diseases, (Paralysis Agitans, Chorea, Eclampsia, Hysteria)		7		1	1	2		11
Epilepsy.....	2	7		6	4		6	25
Mental Diseases:—								
Exhaustion of Acute Mental Disease	6	8		2	5		7	28
Exhaustion of Chronic Mental Disease		7	3	3	1	1		15
General Paresis	5	6		3	5		35	54
Intoxications:—								
Alcoholism		1						1
Morphinism.....								
Metallic Poisoning.....								
Heat Stroke.....								
Debility of Old Age.....	4	10		7	2	1		24
Accident.....		1	1	1	1		35	39
Suicide		1		1				2
Surgical Diseases					1			1
Gynæcological Diseases				1				1
Malignant New Growths, or Cancer.....		3		4	1	1	3	12
Pellagra.....	2							2
Unknown (died on probation).....								
Totals.....	61	111	41	76	48	31	120	488

TABLE No. 10.

Showing form of mental disease of patients admitted, discharged and died during the year.

Mental Disease.	Admitted.			Discharged.			Died.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Infection Psychoses :—									
(a) Fever Delirium.....	1		1	2		2		3	3
(b) Infection Delirium.....	1	3	4		3	3			
(c) Post Infection Psychoses.....									
Exhaustion Psychoses :—									
(a) Collapsed Delirium.....	1	18	19	1	5	6	2	5	7
(b) Acute Confusional Psychoses.....	4	14	18	3	7	10	2	2	4
(c) Neurasthenia.....	16	4	20	12	4	16		1	1
(d) Psychasthenia									
Intoxication Psychoses :—									
(a) Acute Intoxications.....	1	2	3	5	3	8	1		1
(b) Chronic					1	1		1	1
(a) Alcoholism (acute and chronic).....	46	7	53	23	2	25	4		4
(b) Delirium Tremens.....	1		1	1		1			
(c) Korsakow's Psychoses	3		3						
(d) Acute Alcoholic Hallucinosi s.....	6		6	8		8	1		1
(e) Alcoholic Hallucinatory Dementia.....	3	1	4	1		1			
(f) " Paranoia.....	1	1	2	1		1			
(g) " Paresis									
(h) Morphinism.....	3	1	4	2		2			
(i) Cocainism		2	2	2	1	3		1	1
(j) Pelagra.....									
Thyroigenous Psychoses :—									
(a) Mixoedematous Psychoses.....									
(b) Cretinism									
(c) Hyparthyroganous.....									
(d) Exophthalmic Goitre									
Dementia Præcox :—			8						
(a) Hebaphrenic	80	58	131	29	24	53	12	15	27
(b) Catatonic	113	128	242	46	58	104	18	27	45
(c) Paranoid.....	62	60	12	35	24	59	14	17	31
General Paresis	57	8	65	4	1	5	46	10	56
Organic Dementias :— Traumalie.....									
(a) Cerebral Sclerosis	2	2	4	2		2	1		1
(b) Huntingdon's Chorea	1	1	2					2	2
(c) Multiple Sclerosis	2	1	3						
(d) Cerebral Syphilis	1		1	1		1	1		1
(e) Tabetic Psychoses.....	1		1	1		1	1		1
(f) Arterio-sclerotic Psychoses	9	3	12	4		4	1	2	3
(g) Cerebral Tumor, Abscess, Hæmorrhage...	6	4	10				1		1
(h) Tramutic Dementia.....									
Involution Psychoses :—									
(a) Melancholia.....	22	58	80	16	29	45	4	20	24
(b) Pre-senile Delusional Psychoses.....	3	15	18	3	8	11	1	3	4
(c) Senile Dementia.....	59	64	123	18	14	32	58	45	103
(d) Presbyphrenia									
Carried Forward	505	455	960	218	184	402	168	154	322

TABLE No. 10.—Continued.

Showing form of mental disease of patients admitted, discharged and died during the year.

Mental Disease.	Admitted.			Discharged.			Died.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
<i>Brought Forward</i>	505	455	960	218	184	402	168	154	322
Manic Depressive Psychos :—									
(a) Manic States	76	64	140	56	60	116	18	29	47
(b) Depressed States	36	58	94	32	59	91	5	10	15
(c) Mixed States	22	26	48	8	12	20	2	3	5
Paranoia	1	3	4	1	1	2	1	1	2
Psychoses from Constitutional Neuroses :—									
(a) Epileptic Psychoses	34	18	52	9	3	12	18	18	36
(b) Hysterical Psychoses		5	5		6	6			
(c) Traumatic Psychoses									
(d) Post Apoleptic									
States of Deficient Mental Development :—									
(a) Imbecility	44	42	86	17	10	27	8	7	15
(b) Idiocy	3	2	5				2		2
(c) Hypochondriac									
Not Diagnosed	11	3	14	3	2	5	18	26	44
Not Insane	6		6	4		4			
Totals	738	676	1,414	348	337	*685	240	248	488

* Includes 6 deports.

TABLE No. 11.

Periods.	Alleged duration of insanity prior to admission.	Length of residence of those remaining in Hospital on October 31st, 1916.	Periods of treatment of those who were discharged recovered during the year.	Periods of treatment of those who were discharged improved during the year.	Periods of treatment of those who were discharged unimproved during the year.	Periods of treatment of those who died during the year.
Under 1 month.....	205	142	24	17	13	71
From 1 to 2 months.....	125	110	19	19	5	19
“ 2 “ 3 “	88	110	12	11	2	14
“ 3 “ 4 “	86	86	29	17	1	24
“ 4 “ 5 “	25	77	42	19	2	12
“ 5 “ 6 “	94	70	44	14	1	14
“ 6 “ 9 “	47	187	77	51	6	20
“ 9 “ 12 “	92	128	35	30	2	21
“ 12 “ 18 “	109	244	32	37	1	20
“ 18 months to 2 years ..	75	273	13	14	.....	19
“ 2 to 3 years.....	96	428	14	17	.....	34
“ 3 “ 4 “	52	359	3	16	.....	21
“ 4 “ 5 “	81	355	2	6	.....	16
“ 5 “ 10 “	83	1,112	2	14	.....	61
“ 10 “ 15 “	36	735	1	5	.....	36
“ 15 “ 20 “	15	567	1	3	.....	28
“ 20 years and upwards.	39	919	1	7	.....	58
Unknown.....	66	.....	.....	.....	.....	.....
Not insane.....	.....	.....	.....	.....	.....	.....
Totals.....	1,414	5,902	*351	*297	*33	488

* Includes 2 deported.

TABLE
Showing the general movement and result of treatment of patients in the Hospitals
1882, to the 31st

—	Average daily Population.			Number of patients admitted.			Number of patients recovered.			Patients discharged improved, unimproved and deported.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Average for 5 years 1882-1886.....	1,312	1,330	2,642	264	234	498	82	87	169	36	40	76
Average for 5 years 1887-1891.....	1,586	1,532	3,118	314	306	620	88	85	173	38	46	84
Average for 5 years 1892-1896.....	1,894	1,932	3,826	354	394	748	106	111	217	44	55	99
1897.....	2,097	2,157	4,254	507	398	905	107	116	223	42	52	94
1898.....	2,153	2,215	4,368	349	411	759	122	129	251	54	59	113
1899.....	2,183	2,258	4,441	368	343	711	116	145	261	48	47	95
1900.....	2,197	2,288	4,485	352	370	722	121	133	254	28	44	72
1901.....	2,236	2,368	4,604	372	370	740	145	130	275	26	31	57
Average for 5 years 1897-1901.....	2,173	2,257	4,430	389	379	767	122	131	253	40	46	86
1902.....	2,249	2,461	4,710	381	578	959	121	139	260	51	61	112
1903.....	2,283	2,490	4,773	404	416	820	146	176	322	41	60	101
1904.....	2,346	2,551	4,897	486	537	1,023	146	156	302	39	60	99
1905.....	2,396	2,616	5,012	511	538	1,049	149	166	315	64	57	121
1906.....	2,478	2,699	5,177	517	568	1,085	142	172	314	79	76	155
Average for 5 years 1902-1906.....	2,350	2,564	4,914	456	527	983	141	162	303	55	63	118
1907.....	2,511	2,747	5,258	568	528	1,096	146	166	312	118	97	215
1908.....	2,586	2,814	5,400	577	547	1,124	115	109	224	147	99	246
*1909.....	2,629	2,871	5,500	438	405	843	152	125	277	100	97	197
1910.....	2,662	2,879	5,541	567	573	1,140	146	169	315	126	138	264
1911.....	2,708	2,884	5,592	560	580	1,140	135	164	299	138	142	280
Average for 5 years 1907-1911.....	2,619	2,839	5,448	542	527	1,069	139	147	286	126	114	240
1912.....	2,748	2,934	5,682	653	594	1,247	141	155	296	171	148	319
1913.....	2,832	2,990	5,822	710	627	1,337	167	147	314	181	163	344
1914.....	2,877	3,042	5,919	684	667	1,351	203	163	366	.....	.....	.....
1915.....	2,884	3,088	5,972	689	615	1,304	146	147	293	159	182	341
1916.....	2,936	2,993	5,929	738	676	1,414	184	165	349	158	168	326

* 10 months ending October 31st, 1909.

No. 12.

for the Insane of the Province during the thirty-five years from January 1st, October, 1916.

Number of patients who died.			Percentage of recoveries to average daily population.			Percentage of deaths to average daily population.			Number of patients remaining in Hospitals at end of each year.		
Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
91	63	154	6.25	6.54	6.39	6.94	4.74	5.83	1,329	1,446	2,775
88	83	171	5.56	5.88	5.55	5.56	5.42	5.48	1,600	1,601	3,201
124	93	217	5.59	5.75	5.67	6.55	4.82	5.69	1,910	1,955	3,865
145	117	262	5.10	5.38	5.24	6.91	5.42	6.17	2,116	2,163	4,279
130	108	238	5.67	5.88	5.77	6.04	4.88	5.46	2,152	2,236	4,388
160	132	292	5.31	6.42	5.87	7.28	5.85	6.57	2,176	2,251	4,427
136	133	269	5.51	5.82	5.67	6.19	5.81	6.00	2,198	2,300	4,498
150	107	257	6.48	5.47	5.97	6.70	4.52	5.61	2,236	2,368	4,604
144	120	264	5.61	5.79	5.70	6.22	5.29	5.96	2,175	2,264	4,439
158	129	287	5.38	5.65	5.52	7.02	5.24	6.09	2,248	2,464	4,712
150	139	289	6.39	7.07	6.75	6.57	5.58	6.05	2,287	2,492	4,779
172	163	335	6.22	6.12	6.18	7.35	6.39	6.84	2,328	2,543	4,871
141	147	288	6.22	6.34	6.28	5.88	5.62	5.75	2,435	2,657	5,092
173	184	357	5.73	6.37	6.06	5.73	6.37	6.06	2,491	2,720	5,211
159	152	311	5.99	6.31	6.15	6.51	5.84	6.18	2,358	2,575	4,933
197	176	373	5.82	6.04	6.01	7.84	6.41	7.09	2,549	2,765	5,314
193	158	351	4.45	3.87	4.15	7.46	5.61	6.50	2,614	2,877	5,491
132	127	259	5.89	4.38	5.11	5.02	4.42	4.71	2,634	2,897	5,531
174	164	338	5.48	5.87	5.69	6.54	5.69	6.10	2,688	2,921	5,609
200	215	415	4.99	5.68	5.33	7.38	7.45	7.42	2,715	2,925	5,640
179	168	347	5.30	5.17	5.25	6.85	5.92	6.38	2,640	2,877	5,517
241	219	460	5.13	5.29	5.21	8.77	7.46	8.09	2,769	2,957	5,726
213	195	408	5.89	4.82	5.38	7.52	6.52	6.99	2,881	3,031	5,912
219	195	414	7.03	5.36	6.18	7.54	6.40	7.00	2,882	3,104	5,986
282	233	515	5.07	4.76	5.06	9.78	7.54	8.62	2,924	3,116	6,040
240	248	488	6.23	5.51	5.88	8.17	8.28	8.23	2,877	3,025	5,902

TABLE No. 13.

Showing the percentage of recoveries on the average population and admissions for the year ending October 31st, 1916.

Hospitals.	On average population.			On admission.		
	Average population.	Recovered.	Percentage.	Admission.	Recovered.	Percentage.
Brockville.....	792	49	6.11	213	49	23.0
Hamilton	1,332	48	3.60	275	48	17.5
Kingston	563	60	10.66	134	60	44.8
London	1,149	63	5.48	218	63	28.8
Mimico.....	689	40	5.80	156	40	25.7
Penetang	364	.....	.....	27	.....	.....
Toronto	1,041	89	8.55	391	89	22.7
Totals.....	5,930	349	5.88	1,513	349	22.9

TABLE No. 14.

Showing summary of discharges during the year.

	Male.	Female.	Total.
Discharged, Recovered.....	184	165	349
“ Improved	138	157	295
“ Unimproved.....	20	11	31
“ Deported	12	6	18
“ Eloped.....	41	2	43
“ Not Insane.....	4	.....	4
Total Number of Discharges.....	399	341	740

TABLE No. 15.

Deaths in Hospitals.

Hospitals.	No. of Deaths.	Daily average. population.	Percentage of deaths on daily average population.
Brockville.....	61	792	7.83
Hamilton.....	111	1,332	8.33
Kingston	41	563	7.28
London.....	76	1,149	6.61
Mimico.....	46	689	6.96
Penetang.....	31	364	7.42
Toronto	120	1,041	11.52
Totals	488	5,930	8.23

TABLE NO. 16.

The following table shows the number of beds in each of the Hospitals, number in residence, number of vacancies, over population and applications on file at close of official year.

Asylums.	Number of beds.			Number in residence on 31st October, 1916.			Number of vacancies.			Over population.			Applications on file.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Brockville	386	378	764	383	401	784	3	.....	3	.....	23	23	8	7	15
Hamilton	656	639	1,295	682	638	1,320	.....	1	1	26	.....	26	5	9	14
Kingston	311	268	579	304	262	566	7	6	13	.....	.....	.....	1	2	3
London	511	555	1,066	564	607	1,171	.....	.....	.....	53	52	105	2	8	10
Mimico	340	320	660	339	339	678	1	.....	1	.....	19	19	21	19	40
Penetang	166	203	369	165	198	363	.....	.....	.....	1	5	6	.....	.....	.....
Toronto	426	426	852	440	580	1,020	.....	.....	.....	14	54	68	12	6	18
Totals	2,796	2,789	5,585	2,877	3,025	5,902	11	7	18	94	153	247	49	51	100

TABLE No. 17.

Showing the number of officers and employees in each and all of the Hospitals classified according to the duties performed.

Occupation.	Brockville Hospital.	Hamilton Hospital.	Kingston Hospital.	London Hospital.	Mimico Hospital.	Penetang Hospital.	Toronto Hospital.	Total.
Medical Superintendents.....	1	1	1	1	1	1	1	7
Assistant Superintendents	1	1	1	.....	1	.....	1	5
Assistant Physicians.....	1	2	2	1	2	1	2	11
Trained Nurses.....	2	.....	1	1	.....	1	.....	5
Dentists.....	.....	.....	.....	.....	1	.....	1	2
Bursars	1	1	1	1	1	1	1	7
Bursars' Clerks	1	1	.....	1	1	.....	1	5
Stenographers and Portresses.....	2	3	2	2	1	1	3	14
Storekeeper and Assistants.....	1	2	1	2	1	1	1	9
Matrons.....	.....	1	.....	1	1	1	1	5
Assistant Matrons .....	.....	2	.....	1	.....	.....	.....	3
Cooks	5	10	3	12	3	2	7	42
Laundresses.....	4	6	2	5	3	3	6	29
Housemaids	9	5	3	8	3	3	7	38
Seamstresses	1	2	1	2	1	1	1	9
Tailoresses.....	1	.....	1	1	1	.....	.....	4
Bakers.....	1	1	1	1	1	1	1	7
Assistant Bakers .....	.....	.....	.....	.....	.....	.....	.....	.....
Butchers	1	1	.....	.....	1	.....	1	4
Tailors	1	1	1	1	.....	.....	1	5
Shoemakers .....	.....	1	.....	1	.....	.....	.....	2
Laundrymen.....	1	1	1	1	2	1	.....	7
Engineers and Assistants	3	10	3	3	8	2	2	31
Stokers	8	.....	4	13	.....	3	5	33
Bricklayers and Masons.....	1	1	2	2	1	1	.....	8
Carpenters	1	2	1	2	1	2	1	10
Painters.....	1	1	1	1	1	1	.....	6
Farmers	1	1	1	1	1	1	1	7
Farmers' Assistants	9	11	2	8	3	4	1	38
Gardeners.....	1	1	1	1	1	1	1	7
Assistant Gardeners .....	.....	.....	1	2	2	.....	.....	5
Chief Attendants, Male.....	1	1	1	4	1	1	1	10
Supervisors, Male.....	10	9	9	7	7	1	13	56
Attendants, Male	25	35	18	38	20	8	13	157
Chief Attendants, Female .....	.....	1	.....	2	1	.....	2	6
Supervisors, Female.....	7	14	3	7	7	4	10	52
Attendants, Female	37	32	35	45	27	10	41	227
Musical Instructresses.....	.....	.....	.....	.....	.....	.....	1	1
Tinsmiths .....	.....	.....	.....	1	.....	.....	.....	1
Totals	139	161	104	180	106	57	128	875

TABLE No. 18.

Statement of Revenue from Paying Patients and Farm and Miscellaneous Revenue.

Hospital.	No. of Paying Patients.	From Paying Patients.	From Farm and Miscel- laneous.	Total.
		\$ c.	\$ c.	\$ c.
Brockville	197	26,672 62	3,274 51	29,947 13
Cobourg .....	.....	1,792 13	36 00	1,828 13
Hamilton	485	51,041 71	2,710 37	53,752 08
Kingston	148	21,972 08	1,015 47	22,987 55
London	459	43,635 45	4,653 06	48,288 51
Mimico	271	24,371 65	1,298 57	25,670 22
Penetanguishene	29	2,157 17	1,972 22	4,129 39
Toronto	399	51,553 29	622 26	52,175 55
Totals	1,988	223,196 10	15,582 46	238,778 56
Revenue from Railway Taxation, under 6 Edward VII., Cap. 9, Sec. 4, Sub- sec. 2 .....	.....	.....	.....	127,563 70
	.....	.....	.....	363,342 26

TABLE No. 19.

COMPARATIVE STATEMENT OF REVENUE.

The following statement shows the revenue received from the Hospitals for each year since 1871, together with the number of paying patients in the Hospitals from year to year :

	No. of Paying Patients.	Revenue.	Increase.	Decrease.
		\$ c.	\$ c.	\$ c.
For the year ending September 30, 1871..	118	14,045 30	.....	.....
" " 1872..	139	19,255 80	5,219 50	.....
" " 1873..	171	16,660 61	.....	2,595 19
" " 1874..	182	20,035 77	3,373 15	.....
" " 1875..	231	21,875 92	1,840 15	.....
" " 1876..	256	21,175 93	.....	699 99
" " 1877..	323	28,093 58	6,917 65	.....
" " 1878..	334	30,103 75	2,010 17	.....
" " 1879..	343	32,398 26	2,794 51	.....
" " 1880..	387	37,653 81	4,755 55	.....
" " 1881..	414	41,066 54	3,412 73	.....
" " 1882..	475	43,937 64	2,871 10	.....
" " 1883..	538	59,922 59	15,984 95	.....
" " 1884..	496	48,135 18	.....	11,787 41
" " 1885..	509	49,620 93	1,485 73	.....
" " 1886..	516	53,030 05	4,309 12	.....
" " 1887..	514	48,742 53	.....	4,287 52
" " 1888..	538	59,638 16	10,895 03	.....
" " 1889..	708	66,670 64	7,032 48	.....
" " 1890..	562	62,754 16	.....	3,916 48
" " 1891..	577	48,507 52	.....	14,246 14
" " 1892..	632	73,240 61	14,733 19	.....
" " 1893..	661	73,415 54	174 93	.....
" " 1894..	697	72,722 04	.....	693 50
" " 1895..	743	68,290 31	.....	4,431 73
" " 1896..	904	97,898 19	29,607 88	.....
" " 1897..	844	100,581 25	2,683 06	.....
" " 1898..	770	72,042 44	.....	28,538 81
" " 1899..	778	74,364 54	2,322 10	.....
" " 1900..	846	81,650 87	7,286 33	.....
" " 1901..	902	90,677 46	9,026 59	.....
" " 1902..	959	101,076 20	10,398 74	.....
" " 1903..	1,029	97,416 03	.....	3,660 17
" " 1904..	1,111	106,167 49	8,751 46	.....
" " 1905..	1,211	114,915 59	8,748 10	.....
For the 3 mos. ending December 31, 1905..	.....	54,897 06	27,403 60	.....
For the year ending December 31, 1906..	1,732	165,404 08	50,488 49	.....
" " 1907..	1,797	166,419 63	1,015 55	.....
" " 1908..	1,878	146,148 77	.....	3,739 24
For the 10 mos. ending October 31, 1909..	1,613	140,048 18	.....	.....
" " year " " 1910..	1,891	168,914 54	.....	.....
" " " " 1911..	1,899	183,077 18	14,162 64	.....
" " " " 1912..	1,963	189,096 93	6,019 75	.....
" " " " 1913..	.....	205,649 41	16,552 48	.....
" " " " 1914..	.....	213,517 87	7,868 46	.....
" " " " 1915..	.....	225,178 83	11,660 96	.....
" " " " 1916..	.....	236,805 83	11,627 00	.....

In addition \$127,563.70 revenue for the year ending Oct. 31, 1916, was derived from Railway Taxation under 6 Edward VII. c. 9.

Revenue from Woodstock and Orillia not included in 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915 and 1916.

TABLE No. 20.
STATEMENT.

Showing the Expenditure on Maintenance under the different headings of the estimates for the year ending October 31st, 1916.

Headings of Estimates.	Brockville Hospital.	Cobourg Hospital.	Hamilton Hospital.	Kingston Hospital.	London Hospital.	Mimico Hospital.	Penetang. Hospital.	Toronto Hospital.
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Medicines and medical comforts.....	1,490 00	120 65	1,363 51	2,081 35	1,335 35	1,183 86	314 24	1,350 31
Groceries, provisions and butcher's cattle....	36,366 08	5,158 93	75,884 09	35,607 46	61,947 67	31,639 11	15,748 79	66,715 84
Fuel, light and water.....	19,813 55	2,376 56	29,153 63	18,073 50	19,934 23	13,811 63	10,569 53	24,737 90
Clothing	6,994 19	316 16	9,678 94	6,492 24	9,776 67	5,803 32	3,136 84	6,952 62
Laundry and cleaning	2,418 53	549 69	2,969 50	2,737 60	4,388 88	2,741 09	795 22	3,297 71
General repairs	5,713 06	227 25	9,425 49	7,493 92	10,760 67	3,781 23	1,129 54	7,919 62
Office expenses.....	1,260 01	148 03	1,597 14	1,003 68	1,457 31	1,033 54	278 75	1,113 19
Farm expenses.....	8,862 62	381 94	8,996 10	5,397 72	9,485 37	3,066 77	4,474 77	980 79
Contingencies	2,048 89	399 85	3,056 76	2,239 93	2,059 10	1,097 15	692 74	2,840 73
Total expense.....	84,966 93	9,679 06	142,125 16	81,117 40	121,145 25	64,157 70	37,140 42	115,908 71
Salaries	50,741 05	7,758 73	62,389 22	41,215 10	63,386 63	40,871 79	24,160 29	50,940 65
Grand Totals	135,707 98	17,437 79	204,514 38	122,332 50	184,531 88	105,029 49	61,300 71	166,849 36
Total.....	\$997,704.09							

TABLE

Comparative Statement of Average Maintenance Cost per Capita

	Brockville.		Hamilton.		Kingston.	
	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.
Days' residence of patients.....	277,297	268,165	468,437	456,368	206,429	206,082
Average number of patients	757.64	734.69	1,279.88	1,250.32	564.01	564.61
	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
MEDICINES.....	.54	.49	.30	.24	1.03	.72
Medicines and Medical comforts.....	.54	.49	.30	.24	1.03	.72
PROVISIONS.....	13.05	11.85	15.60	13.90	14.96	13.17
Breakfast Foods and Cereals.....	.24	.24	.26	.20	.29	.30
Butter	2.12	1.87	2.58	2.25	2.61	2.16
Coffee and Tea.....	.38	.43	.47	.52	.36	.43
Eggs.....	.39	.29	.83	.60	.38	.23
Flour, Bread, etc.....	2.34	1.93	2.17	2.06	1.91	1.73
Fruit and Vegetables—Fresh .....	.42	.43	.55	.70	.69	.65
“ “ Canned and Dried .....	.65	.49	.62	.44	.83	.70
Milk.....	1.57	1.51	1.53	1.36	1.73	1.05
Potatoes.....	.55	.39	1.15	.46	.69	.53
Salt, Spices, Pickles, etc .....	.10	.06	.06	0.6	.18	.12
Sugar and Syrup.....	1.00	.95	.83	.86	1.06	.94
Unenumerated Groceries .....	.89	.99	1.17	1.02	.83	.93
Butchers' Meat	1.97	1.88	2.85	2.82	2.72	2.95
Fish and Fowl .....	.43	.39	.53	.55	.68	.45
FUEL, LIGHT AND WATER.....	7.59	8.01	4.74	6.37	7.63	7.07
Coal and Wood.....	5.37	5.67	3.29	4.77	7.57	7.02
Electricity .....	.64	.61	.47	.50	.....	.....
Gas .....	.41	.79	.26	.29	.....	.....
Oil, Candles, Matches, etc .....	.07	.08	.02	.02	.06	.05
Water.....	1.10	.86	.70	.79	.....	.....
CLOTHING	2.26	2.15	1.74	1.39	2.70	2.30
Clothing—Dry Goods	1.47	1.63	1.14	1.18	2.03	1.82
Boots, Shoes, etc .....	.79	.52	.60	.21	.67	.48
LAUNDRY AND CLEANING .....	.82	.90	.59	.45	1.06	1.16
Brushes, Brooms and Mops .....	.14	.14	.10	.08	.29	.27
Miscellaneous Expenses .....	.20	.23	.17	.15	.25	.44
Soap .....	.48	.53	.32	.22	.52	.45
GENERAL REPAIRS.....	2.14	2.23	1.55	1.91	3.31	3.16
Furniture and Furnishings.....	1.58	1.55	1.18	1.52	2.41	2.47
Plant .....	.56	.68	.37	.39	.90	.69
OFFICE EXPENSES .....	.45	.41	.34	.34	.47	.54
Miscellaneous Items.....	.18	.19	.17	.18	.23	.32
Postage .....	.16	.12	.09	.08	.12	.12
Telephone and Telegraph.....	.11	.10	.08	.08	.12	.10
SALARIES.....	16.32	17.33	12.04	13.48	18.95	20.06
Supt. and Physicians	1.76	1.94	1.39	1.49	2.59	2.50
Bursar and Assistants.....	1.43	1.22	1.24	1.12	1.95	1.88
Matron and Assistants.....	2.72	2.59	2.37	2.49	2.60	2.72
Engineer and Assistants	1.96	1.63	1.09	1.15	1.94	1.58
Artisans, not Domestic .....	.80	.85	.54	.54	1.22	1.33
Teachers.....	.....	.....	.....	.....	.....	.....
Attendants and Nurses.....	7.65	8.98	5.27	6.67	8.59	9.95
Temporary Assistance.....	.....	.12	.14	.02	.06	.....

No. 21.

per Day for the Twelve Months ending 31st October, 1916.

London.		Mimico.		Orillia.		Penetang.		Toronto.		Woodstock.	
This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.
416,844	409,118	238,598	238,854	300,303	301,859	133,113	132,767	368,109	357,932	75,726	74,987
1,138.92	1,120.86	651.91	654.39	820.50	827.01	363.70	363.74	1,005.76	980.63	206.90	205.44
Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
.32	.28	.50	.49	.48	.42	.24	.19	.37	.41	.83	.83
.32	.28	.50	.49	.48	.42	.24	.19	.37	.41	.83	.83
13.41	11.48	11.93	11.25	10.98	10.23	11.00	9.62	14.38	13.83	14.26	14.34
.24	.23	.28	.27	.22	.28	.20	.17	.19	.19	.21	.19
2.51	2.13	2.31	1.91	2.53	2.20	2.09	1.86	2.51	2.45	2.99	3.16
.69	.66	.38	.35	.32	.32	.57	.55	.49	.47	.38	.38
.29	.24	.21	.20	.30	.25	.02	.02	.57	.49	.06	.11
1.94	1.58	1.98	1.69	2.38	2.25	1.94	1.69	1.62	1.65	2.17	2.12
.44	.44	.37	.57	.41	.44	.36	.39	.31	.36	.63	.72
.41	.45	.27	.15	.49	.20	.44	.27	.81	.45	1.04	.66
1.38	1.21	1.10	1.03	1.14	1.22	1.74	1.58	1.53	1.86	2.62	2.94
.51	.36	.57	.28	.24	.29	.44	.28	1.02	.67	.93	.69
.07	.07	.06	.05	.04	.05	.02	.01	.08	.08	.06	.05
1.05	.83	.77	.94	.77	.75	.34	.26	.83	.80	.99	1.08
.82	.74	.57	.78	.77	.68	.96	.60	.78	.74	.43	.40
2.38	1.97	2.56	2.47	1.06	1.06	1.41	1.36	2.98	2.83	1.02	.99
.68	.57	.50	.56	.31	.24	.47	.58	.66	.79	.73	.85
5.79	4.88	5.89	7.37	4.00	3.62	6.51	5.57	5.87	6.37	8.06	8.13
4.99	3.91	5.35	6.80	3.21	2.85	4.79	4.03	4.04	4.93	4.92	4.97
.60	.75	.45	.47	.61	.60	.18	.39	.21	.25	.80	.80
.17	.20	.....	.....	.....	.....	.....	.....	.80	.73	.....	.....
.03	.02	.09	.10	.02	.02	.03	.02	.04	.03	.03	.03
.....	.....	.....	.....	.16	.15	1.51	1.13	.78	.43	2.31	2.33
2.25	1.89	2.08	2.03	3.02	2.07	2.40	1.81	1.70	1.25	.27	1.11
1.51	1.37	1.58	1.54	2.26	1.34	1.66	1.34	1.38	1.02	.12	.97
.74	.52	.50	.49	.76	.73	.74	.47	.32	.23	.15	.14
1.10	.91	1.10	1.24	1.04	.88	.50	.64	.88	.86	.93	.97
.18	.16	.16	.18	.19	.17	.09	.09	.12	.12	.10	.14
.25	.17	.29	.27	.15	.06	.15	.22	.24	.19	.25	.28
.67	.58	.65	.79	.70	.65	.26	.33	.52	.55	.58	.55
2.54	2.05	2.14	1.76	2.48	1.70	1.45	1.32	2.20	1.66	1.69	2.23
2.11	1.63	1.78	1.21	1.72	1.22	.16	.87	1.96	1.28	.86	1.46
.43	.42	.36	.55	.76	.48	.29	.45	.24	.38	.83	.77
.35	.32	.43	.44	.28	.28	.20	.27	.30	.33	.39	.41
.18	.18	.15	.21	.09	.12	.07	.14	.15	.19	.11	.14
.10	.07	.14	.10	.13	.10	.06	.05	.05	.03	.14	.11
.07	.07	.14	.13	.06	.06	.07	.08	.10	.11	.14	.16
13.79	15.22	15.55	16.57	10.64	10.66	15.91	15.97	13.43	14.61	18.76	19.53
1.27	1.74	2.53	2.61	1.90	1.85	2.70	2.56	1.67	1.87	5.02	5.07
1.26	1.15	1.52	1.39	.97	.91	1.88	1.88	1.54	1.47	2.54	2.53
2.59	2.58	2.33	2.35	2.59	2.62	2.95	2.95	2.31	2.35	3.85	4.18
1.41	1.59	1.90	2.02	.85	.94	1.78	1.65	.96	.98	1.15	1.19
.97	.94	.79	.90	.56	.60	1.80	1.80	.61	.63	.95	.96
.....	.....	.....	.....	.41	.32	.....	.....	.....	.....	.....	.....
6.29	7.22	6.48	7.29	3.33	3.38	4.80	5.10	6.31	7.17	5.22	5.53
.....	.....	.....	.01	.03	.04	.....	.03	.03	.14	.03	.07

TABLE

Comparative Statement of Average Maintenance Cost per Capita

	Brockville.		Hamilton.		Kingston.	
	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.
Days' residence of patients.....	277,297	268,165	468,437	456,368	206,429	206,082
Average number of patients	757.64	734.69	1,279.88	1,250.32	564.01	564.61
	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
ALLOWANCES	4.69	4.49	2.93	3.74	5.55	5.87
Employees' Meals	4.32	3.97	2.65	3.38	4.97	5.28
" Uniforms .....	.22	.28	.22	.29	.31	.35
" Other Allowances .....	.15	.24	.06	.07	.27	.24
FARM AND GARDEN.....	6.92	7.06	4.79	4.94	4.82	4.35
Feed and Fodder.....	3.58	3.75	2.60	2.29	3.09	2.25
Miscellaneous Farm Expenses	1.12	1.10	.59	.96	.47	.78
Seeds, etc.....	.24	.31	.33	.28	.25	.26
Salaries.....	1.98	1.90	1.27	1.41	1.01	1.06
CONTINGENCIES .....	.78	.78	.65	.89	.92	1.02
Amusements, Religion, Education .....	.21	.15	.04	.05	.18	.21
Elopers, Cost of Recovery.....	.02	.02	.01	.01	.04	.03
Freight, Duties, etc.....	.08	.12	.08	.08	.11	.16
Ice .....	.08	.05	.14	.34	.....	.....
Incidental Expenses.....	.30	.38	.33	.38	.49	.58
Officers' Travelling Expenses.....	.09	.06	.05	.03	.10	.04
Per Capita cost per day, less Salaries.....	32.57	31.98	29.03	29.02	35.89	32.43
" " " " " of Salaries	22.99	23.72	16.24	18.63	25.51	26.99
Total gross per Capita cost per day.....	55.56	55.70	45.27	47.65	61.40	59.42
Less total recovery per Capita per day	15.87	15.89	15.39	14.95	14.97	14.45
Net per Capita burden payable by Province.....	39.69	39.81	29.88	32.70	46.43	44.97

N.B.—The accompanying is a Comparative Statement of the cost of maintenance per patient per day for the twelve months ending 31st October, 1916, in nine Hospitals for the Insane, as compared with the twelve months ending 31st October, 1915, based on actual consumption and calculated to two places of decimals of a cent. The figures in black-faced type represent totals.

Under the headings "Provisions" and "Clothing" is shown the actual consumption by patients—the value of such supplies to officers, attendants, nurses and employees being included in the account "Employees' Meals and Uniforms."

Where no charge is shown for light or water, these are included in the cost of coal.

No. 21—*Concluded.*

per Day for the Twelve Months ending 31st October, 1916.—*Concluded.*

London.		Mimico.		Orillia.		Penetang.		Toronto.		Woodstock.	
This Year	Last Year.	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.
416,844	409,118	238,598	238,854	300,303	301,859	133,113	132,767	368,109	357,932	75,726	74,987
1,138.92	1,120.86	651.91	654.39	820.50	827.01	363.70	363.74	1,005.76	980.63	206.90	205.44
Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
4.10	4.98	4.34	4.98	3.26	3.14	4.03	3.27	3.72	3.62	5.87	5.27
3.80	4.61	3.92	4.57	3.08	2.92	3.76	2.99	3.35	3.26	5.31	4.86
.27	.33	.28	.26	.16	.17	.11	.11	.32	.30	.24	.14
.03	.04	.14	.15	.02	.05	.16	.17	.05	.06	.32	.27
5.01	5.09	4.90	5.21	2.97	3.11	6.01	6.55	.70	.86	15.88	12.16
2.51	2.60	2.02	2.08	1.47	1.80	3.04	4.12	.18	.22	7.24	6.54
.61	.77	.96	1.10	.91	.65	.40	.35	.08	.11	3.68	1.31
.48	.30	.35	.38	.16	.19	.34	.23	.03	.01	.80	.77
1.41	1.42	1.57	1.65	.43	.47	2.23	1.85	.41	.52	4.16	3.54
.50	.47	.51	.62	.35	.39	.38	.52	.77	.87	.33	.25
.09	.08	.10	.10	.07	.08	.01	.02	.05	.04	.03	.04
.02	.01	.....	.02	.....	.....	.....	.....	.....	.01	.....	.01
.04	.07	.04	.05	.10	.12	.09	.19	.09	.15	.06	.11
.....	.....	.14	.14	.....	.03	.....	.....	.27	.23	.....	.....
.34	.29	.23	.29	.16	.15	.26	.28	.28	.40	.23	.05
.01	.02	.....	.02	.02	.01	.02	.03	.08	.04	.01	.04
29.86	25.95	27.91	28.76	25.17	22.23	26.46	24.64	26.76	25.92	38.48	36.89
19.30	21.62	21.46	23.20	14.33	14.27	22.17	21.09	17.56	18.75	28.79	28.34
49.16	47.57	49.37	51.96	39.50	36.50	48.63	45.73	44.32	44.67	67.27	65.23
15.00	16.03	14.87	16.28	7.82	8.85	6.98	8.17	14.25	15.18	34.97	32.15
34.16	31.49	34.50	35.68	31.68	27.65	41.65	37.56	30.07	29.49	32.30	33.08

TABLE
Comparisons, Appropriation, Expenditure, Consumption, Population

	Brockville.	Hamilton.	Kingston.
Days' residence of patients,	277,297	468,437	206,429
Average number of patients.....	757.64	1,279.88	564.01
Medicines.....Appropriation.....	\$1,750	1,800	2,100
Expenditure.....	1,490	1,363 51	2,081 35
Consumption	1,490	1,405 55	2,127 85
Provisions .....Appropriation.....	\$43,000	78,000	37,000
Expenditure.....	36,366 08	75,884 09	35,607 46
Consumption	36,181 33	73,079 41	30,884 57
Fuel, Light and Water..Appropriation.....	\$26,000	36,905 88	18,500
Expenditure.....	19,813 55	29,153 63	18,073 50
Consumption	21,034 46	22,223 95	15,750 42
Clothing, etc.....Appropriation.....	\$7,000	9,700	6,500
Expenditure.....	6,994 19	9,678 94	6,492 24
Consumption	6,266 25	8,148 18	5,582 27
Laundry, etc.....Appropriation.....	\$2,500	3,000	2,740
Expenditure	2,418 53	2,969 50	2,727 60
Consumption	2,273 36	2,781 29	2,189 10
General Repairs, etc....Appropriation.....	\$6,500	10,000	7,500
Expenditure.....	5,713 06	9,425 49	7,493 92
Consumption	5,936 27	7,282 35	6,822 60
Office.....Appropriation.....	\$1,300	1,600	1,500
Expenditure.....	1,260 01	1,597 14	1,003 68
Consumption	1,248 01	1,605 64	966 63
Salaries .....Appropriation.....	\$62,202	74,404	53,770
Expenditure.....	50,741 05	62,389 22	41,215 10
Consumption	63,757 73	76,094 44	52,672 32
Farm, etc.....Appropriation.....	\$9,000	9,000	7,000
Expenditure.....	8,862 62	8,996 10	5,397 72
Consumption	13,696 13	16,466 20	7,858 70
Contingencies.....Appropriation.....	\$2,600	3,850	2,670
Expenditure.....	2,048 89	3,056 76	2,239 93
Consumption	2,155 89	3,060 06	1,896 93
Total Maintenance.....Appropriation.....	\$161,852	228,259 88	139,280
Expenditure.....	135,707 98	204,514 38	122,332 50
Consumption	154,039 43	212,147 07	126,751 39
Capital Accounts .....Appropriation.....	\$40,141 29	25,481 90	31,539 72
Expenditure.....	32,328 01	20,506 99	21,049 25
Grand Total .....Appropriation.....	\$201,993 29	253,741 78	170,819 72
Expenditure.....	168,035 99	225,021 37	143,381 75
REVENUE COLLECTIONS.			
From paying patients this year to date.....	\$26,672 62	51,041 71	21,972 08
“ “ last “	26,522 97	44,138	19,688 79
Patients Revenue per capita this year..... cents	9.62	10.89	10.64
“ “ “ last “	9.89	9.67	9.55
From Farm and Misc. Sales this year.....	\$3,274 51	2,710 37	870 87
“ “ last “	543 68	806 79	819 61
Farm and Mis. Revenue per capita this year.....cents	1.18	58	42
“ “ “ last “	20	10	40
Total Revenue this year.....	\$29,947 13	53,752 08	22,842 95
“ last “	27,066 65	44,944 79	20,508 40
Total Revenue per capita per day this year .....cents	10.80	11.47	11.06
“ “ “ last “	10.09	9.77	9.95
Farm Production Consumption this year .....cents	5.07	3.92	3.91
“ “ “ last “	5.80	5.18	4.50
Total Recovery per capita this year .....cents	15.87	15.39	14.97
“ “ “ last “	15.89	14.95	14.45

No. 22.

and Revenue for the 12 Months ending 31st October, 1916.

London.	Mimico.	Orillia.	Penetang.	Toronto.	Woodstock.
416,844	238,598	300,303	133,113	368,109	75,726
1,138.92	651.91	820.50	363.70	1,005.76	206.90
1,500	1,300	1,500	750	1,800	700
1,335 35	1,183 86	1,440 03	314 24	1,350 31	634 58
1,335 35	1,183 86	1,440 03	314 24	1,353 25	634 58
62,000	35,000	36,500	16,000	68,500	12,000
61,947 67	31,639 11	35,802 28	15,748 79	66,715 84	11,647 15
55,910 17	28,477 45	32,970 36	14,636 56	52,946 17	10,805 35
23,000	23,000	13,000	11,600	25,000	8,500
19,934 23	13,811 63	12,735 70	10,569 53	24,737 90	7,028 48
24,123 55	14,056 04	12,007 31	8,670 75	21,622 08	6,108 09
10,150	6,000	8,000	3,300	7,000	1,500
9,776 67	5,803 32	7,943 43	3,136 84	6,952 62	450 05
9,389 39	4,967 18	9,067 74	3,192 05	6,273 14	201 08
4,500	2,800	3,000	1,200	4,000	1,200
4,388 88	2,741 09	2,983 84	795 22	3,297 71	756 50
4,577 88	2,617 30	3,132 51	671 17	3,247 74	702 99
11,000	6,500	7,500	3,000	8,000	1,800
10,760 67	3,781 23	6,635 88	1,129 54	7,919 62	1,542 32
10,569 83	5,106 65	7,440 76	1,933 35	8,083 30	1,279 57
1,500	1,200	1,200	600	1,512 50	500
1,457 31	1,033 54	801 07	278 75	1,113 19	292 82
1,450 96	1,030 51	849 57	278 75	1,113 19	292 82
73,350	50,135	43,022	28,086	63,522	19,316
63,386 63	40,871 79	33,265 39	24,160 29	50,940 65	17,370 24
80,494 56	51,235 91	43,047 29	29,527 20	64,653 80	21,814 58
9,500	4,000	6,000	4,500	3,700	3,500
9,485 37	3,066 77	5,114 82	4,474 77	980 79	3,481 07
14,991 95	7,935 34	7,620 70	5,026 27	1,074 26	8,875 31
2,500	2,200	1,800	1,150	3,500	1,000
2,059 10	1,097 15	1,053 27	692 74	2,840 73	296 91
2,093 99	1,227 89	1,053 95	503 74	2,840 19	251 06
199,000	132,135	121,522	70,186	186,534 50	50,016
184,531 88	105,029 49	107,775 71	61,300 71	166,849 36	43,500 12
204,937 63	117,838 13	118,630 22	64,744 08	163,207 12	50,965 43
33,584 95	20,000	173,616 76	20,961	438,581 84	16,973 71
23,955 41	9,911 64	154,812 74	16,415 90	434,260 79	7,229 45
232,584 95	152,135	295,138 76	91,147	625,116 34	66,989 71
208,487 29	114,941 13	262,588 45	77,716 61	601,110 15	50,729 57
43,635 45	24,371 65	10,403 99	2,157 17	51,553 29	14,041 52
46,472 68	25,473 59	12,326 01	4,045 79	53,185 30	13,819 08
10.47	10.21	3.47	1.62	14.00	18.53
11.35	10.67	4.08	3.05	14.86	18.42
4,653 06	1,298 57	4,717 47	1,972 22	622 26	3,509 85
771 29	505 92	854 67	499 61	685 32	2,157 35
1.12	54	1.57	1.48	17	4.63
19	21	28	38	19	2.88
48,288 51	25,670 22	15,123 46	4,129 39	52,175 55	17,551 37
47,243 97	25,979 51	13,180 68	4,545 40	53,870 62	15,976 43
11.59	10.75	5.04	3.10	14.17	23.16
11.54	10.88	4.36	3.43	15.05	21.30
3.41	4.12	2.78	3.88	08	11.81
4.54	5.40	4.49	4.74	13	10.85
15.00	14.87	7.82	6.98	14.25	34.97
16.08	16.28	8.85	8.17	15.80	32.15

NOTES ON PER CAPITA STATEMENT.

Attached hereto is a statement of the cost of maintenance per patient per day for the year ending October 31st, 1915, in the ten hospitals mentioned, as compared with the year 1914, being based on actual consumption.

It follows out the order of the sub-divisions of appropriations voted by the Legislature, and is calculated to two places of decimals of a cent. The figures in black-faced type represent totals.

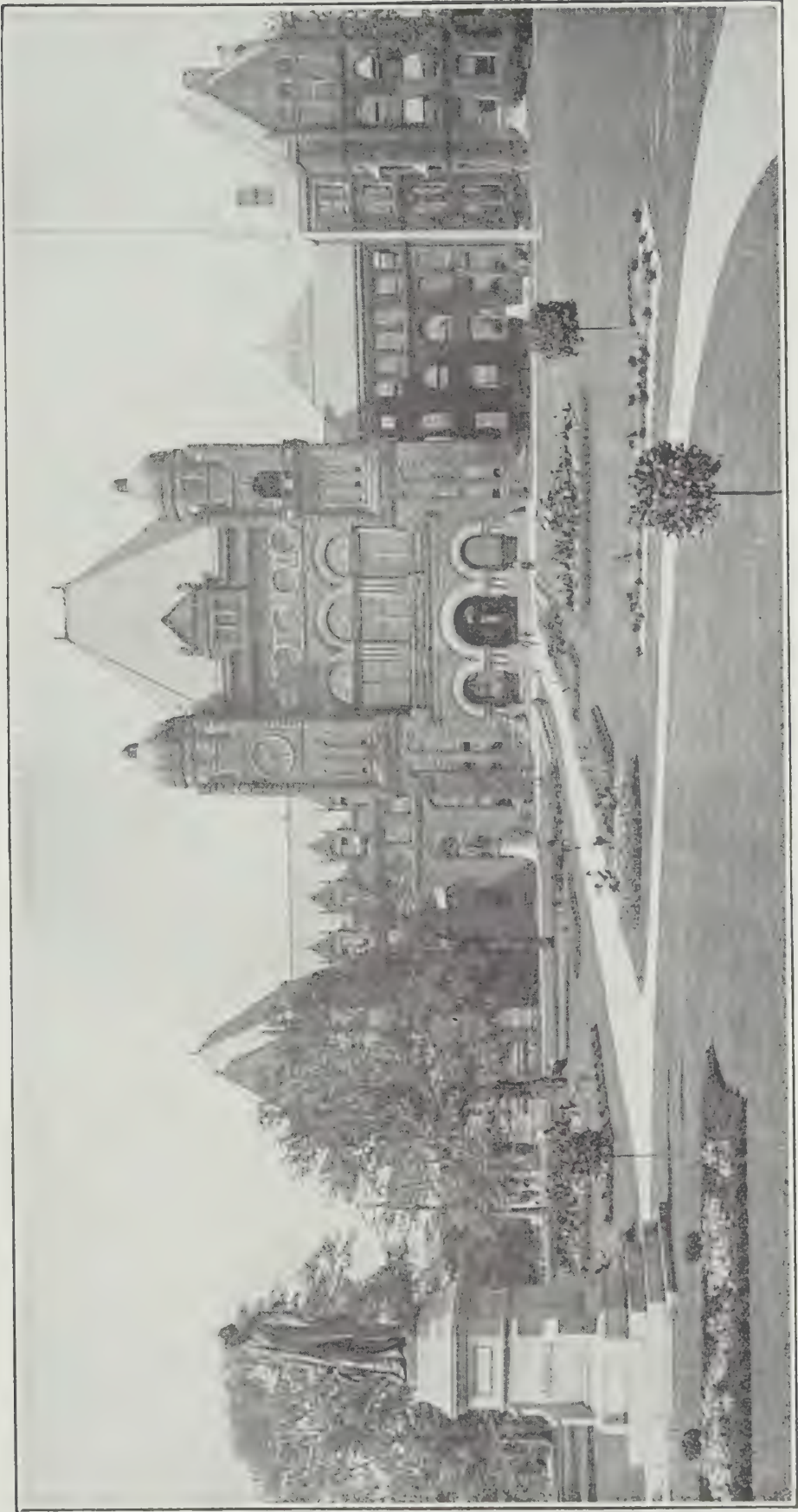
Invoices for all purchases, properly certified by the Bursar and the Storekeeper, as to accuracy and receipt of goods, are checked in the Department before being submitted to the Treasury for payment.

A system of Daily Requisitions for all supplies, such as provisions, is carried out and these requisitions are forwarded to the Department semi-weekly. In case of coal, the amount consumed on each shift is weighed and weekly report of consumption made by the engineer.

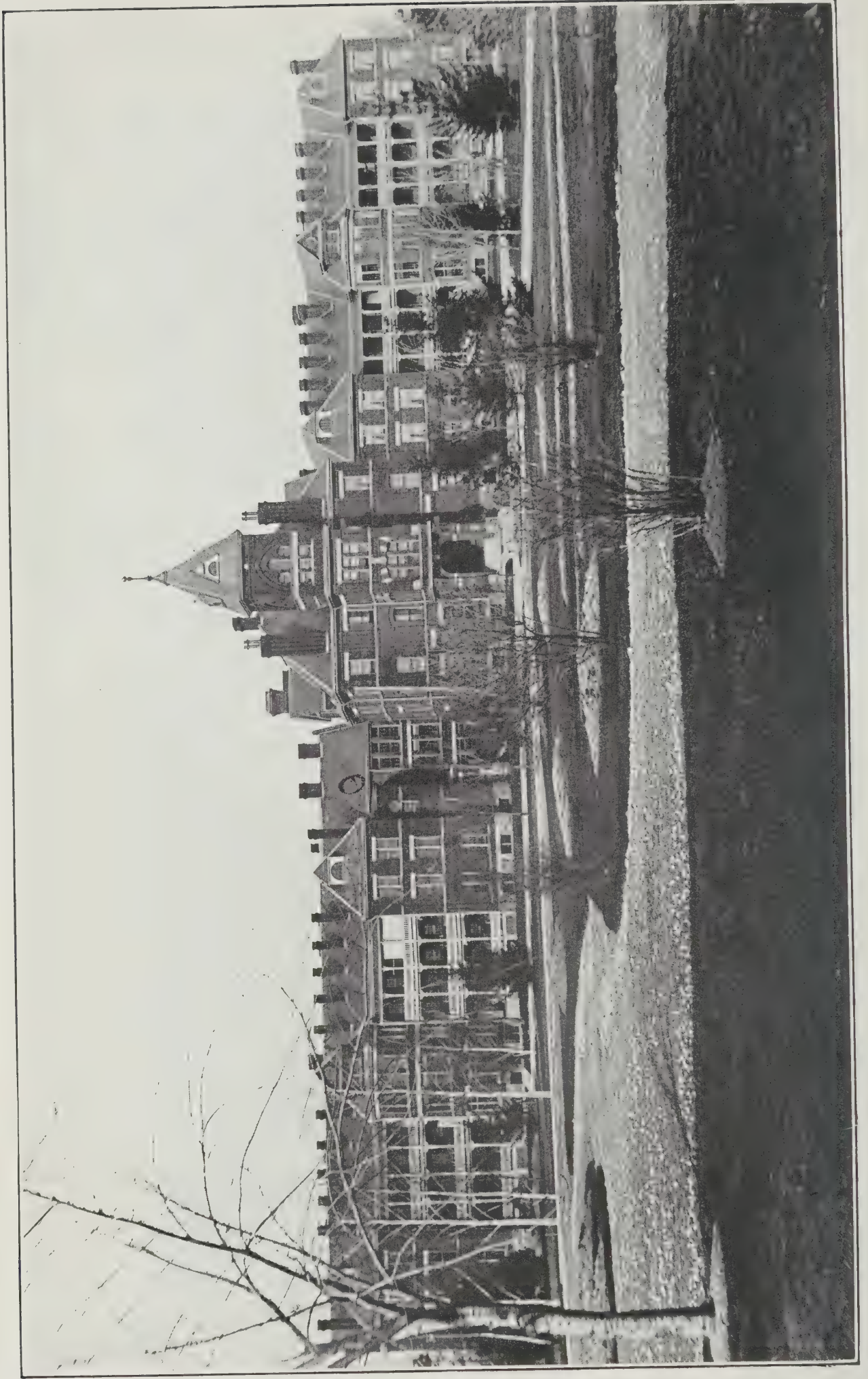
Under headings "Provisions" and "Clothing" is shown only consumption by patients--the value of such supplies to officers, attendants, nurses and employees being included in the account "Employees' Meals and Uniforms" under the heading "Salaries."

Quarterly inventories of stock are taken at each institution, and are checked with the ledger accounts of the Department.

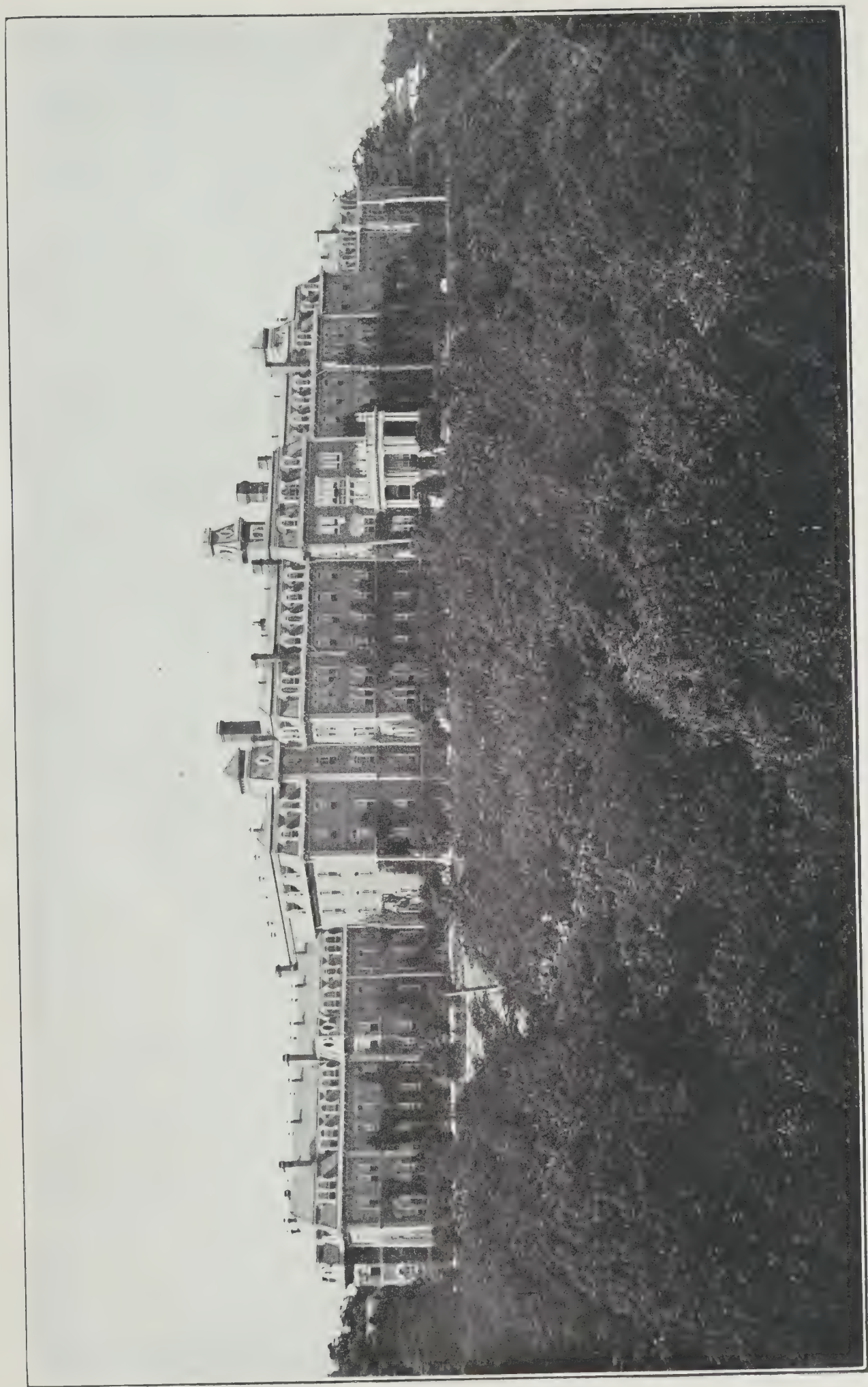
Returns are made of all products of the Farm and Garden, as received, charges being made against the cost of maintenance, and the Farm and Garden given credit for the same; for this purpose a uniform price list is in use for all institutions, regardless of soil or fertility of farm. At the end of the year the value per patient per day of such products--fruits, vegetables, feed and fodder, meat and eggs--is deducted from the gross per capita cost and appears in the statement as "Farm Recoveries."



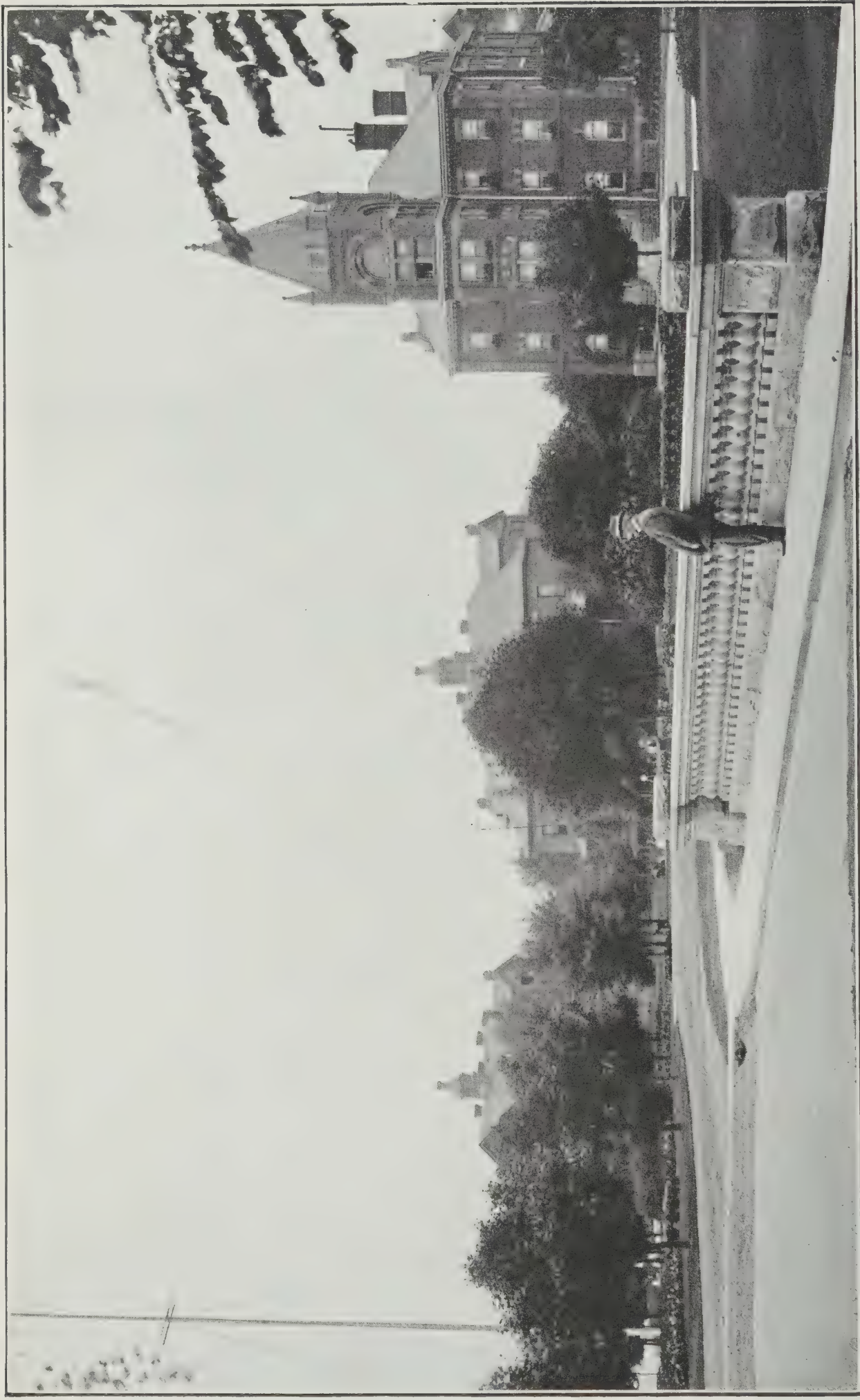
Parliament Buildings, Toronto.



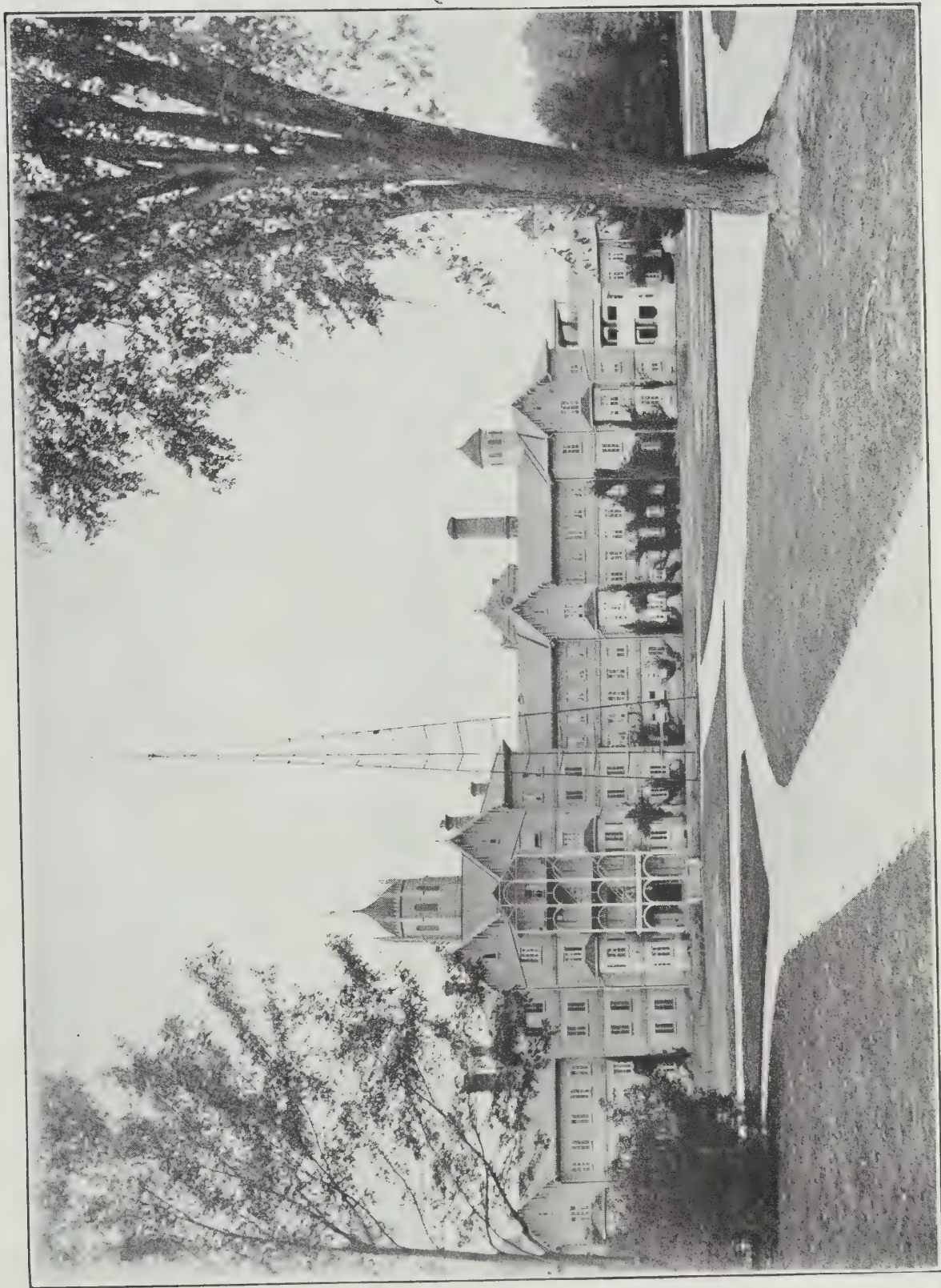
Orchard House, Hamilton.



Main Building, Hamilton.



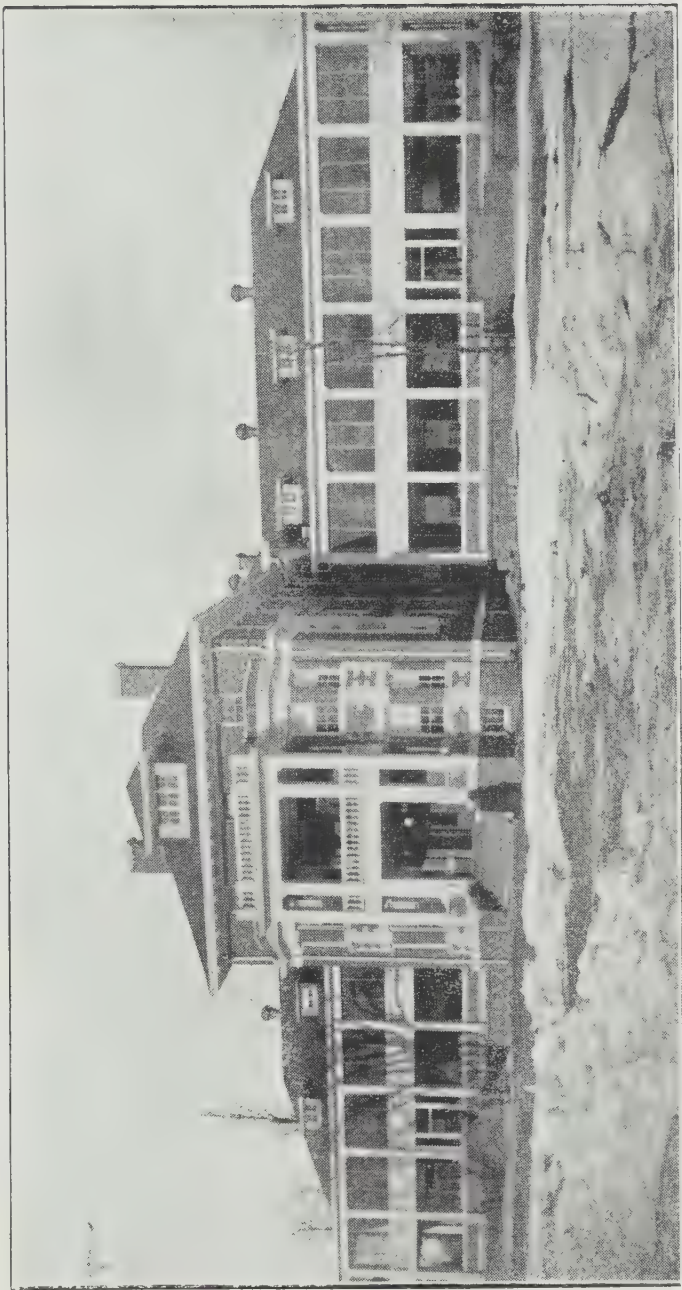
Main Building and Cottages, Mimico.



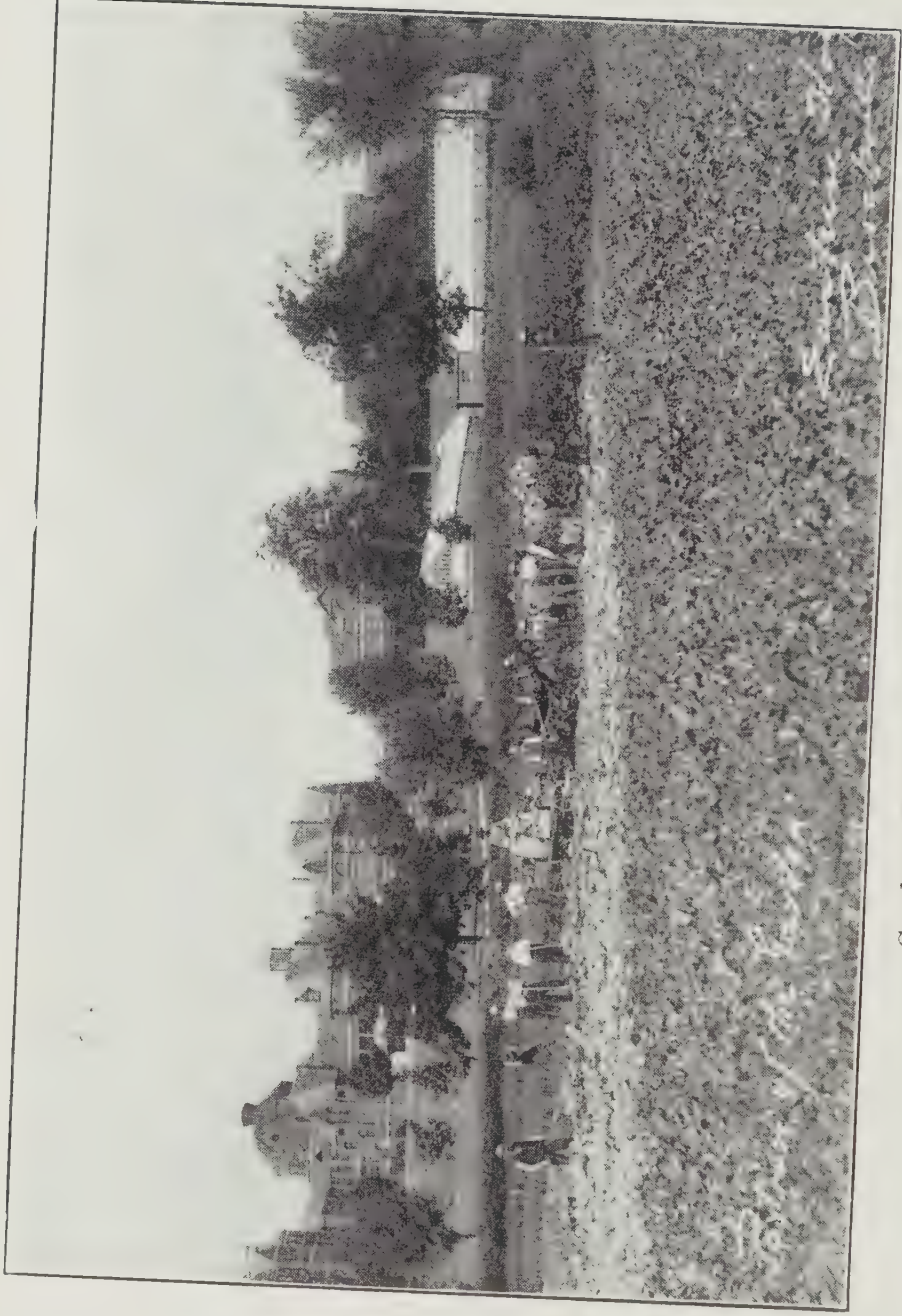
Main Building, London.



Nurses' Home, Kingston.



Reception Hospital, Brockville.



Garden, Eastern Hospital, Brockville.

APPENDIX

TO FORTY-NINTH ANNUAL REPORT UPON THE HOSPITALS FOR
THE INSANE AND CONTAINING THE ANNUAL REPORTS OF
THE MEDICAL SUPERINTENDENTS OF THE HOSPITALS IN
BROCKVILLE, HAMILTON, KINGSTON, LONDON, MIMICO, PENE-
TANGUISHENE, TORONTO, AND HOMEWOOD SANITARIUM,
GUELPH.

ANNUAL REPORT OF THE MEDICAL SUPERINTENDENT AT
HOSPITAL FOR THE INSANE, BROCKVILLE, YEAR ENDING
OCTOBER 31st, 1916.

BROCKVILLE, November 23rd, 1916.

TO EDWIN R. ROGERS, ESQ., AND W. W. DUNLOP, ESQ.,
Inspectors of Public Charities.

SIRS,—I have the honour to submit the Report of this Hospital for the year ending October 31st, 1916.

—	Male.	Female.	Total.	Male.	Female.	Total.
Capacity of Hospital.....	386	378	764			
In residence October 31st 1915				371	386	757
Admitted during year by Warrant	1	1	2			
Admitted by Certificate	110	101	211	111	102	213
Total number under treatment during year.				482	488	970
Discharged during year recovered	27	22	49			
Discharged during year improved	23	28	51			
Discharged during year unimproved	5	4	9			
Discharged during year not insane.....						
Total number discharged during year.....	55	54	109			
Died	29	32	61			
Deported	3	1	4			
Eloped	12		12			
Transferred.....				99	87	186
Remaining in Hospital October 31st, 1916.....				383	401	784

The admissions for the year numbered two hundred and thirteen, a much larger number than any other preceding year. Of these, one hundred and eleven were men and one hundred and two women. One man and one woman were admitted by warrant, the lowest number in the history of the Institution. Last year the female admissions were much in excess of the male, but this year there are a few more men than women. Eleven men and six women were admitted as voluntary patients. This number is increasing every year as this method of admission is being better understood by the general public. In seventy-seven of those admitted during the year the mental disorder has been of such long standing that recovery could not be expected. The number of those admitted over 50 years of age was about the same as last year, although the total number of admissions was much larger

The total number of discharges during the year was one hundred and nine, a much larger number than any previous year. Fifty-five men and fifty-four women were fully discharged. Of the men there were twenty-seven recoveries, twenty-three improved and five unimproved. Of the women, twenty-two were recovered, twenty-eight improved and four unimproved. There were also three men and one woman deported. The three men were fully recovered.

We had twelve men elope during the year, who were not recovered, the greater number of them were taken charge of by their friends at home.

Our death rate was not large considering the number of admissions, their being twenty-nine males and thirty-two females. The total number of discharges, deaths, deports, and elopers was ninety-nine males and eighty-seven females, in all 186. We began the year with a population of 757 and at the close of the year 784 remained in residence.

A brief analysis of the Admissions and Discharges might be interesting.

In the Infectious Exhaustion Psychoses, we admitted seven males and one female. In the same class we discharged six males and one female, and two females died.

In the Toxic Psychoses we admitted seven males and two females. We discharged six males and one female and three males died.

In the Dementia Praecox class we admitted forty-one males and thirty-six females. We discharged seventeen males and nineteen females, and there were two males and eleven females died.

In General Paresis we admitted five males and one female. We discharged two males and four males died. Two males were discharged in the Organic Dementia class and one female died.

In the Melancholia class three males were admitted and four females. We discharged one male and two females died.

In the Senile Dementias eleven males and fourteen females were admitted. Four males and ten females were discharged and thirteen males and seven females died.

In the Manic Depressives we admitted fifteen males and eighteen females. Discharged eleven males and sixteen females, and in the deaths there were five males and seven females.

In the Epileptics we admitted ten males and three females; discharged two males and two females, and one male and one female died.

In the Imbeciles and Idiots we admitted twelve males and ten females. Discharged four males and one female and one male died.

In Pellagra we admitted one female and the same patient died some months later.

The general health of the Institution has been good. We had two cases of typhoid, but both recovered.

There has been no special change in treatment this year. The Hydrotherapy equipment has been taxed to full capacity in giving the treatment required. Occupations and diversions in the way of games and sports have been used to their fullest extent. It is very difficult to employ some of the patients with any form of work, although it is indisputable that such is conducive to their mental and physical improvement, and every effort is put forth in that respect.

Our Annual Sports this year were a great success. All the patients who were sufficiently well mentally, derived much pleasure from them. At the same time there was a very good exhibit of work done by patients in the women's wards.

We also had an exhibit of farm and garden produce and work done by female patients, at both our own and Toronto Exhibitions.

The Training School did fairly good work, considering the interruption at the beginning of the year in making preparations for the supplies in the Orpington Hospital, England. Our nurses took hold of this work enthusiastically, and did all they could to provide the material required. The classes did good work in their examinations and took good standing.

Our Graduation Exercises were held on June 16th, and six of our nurses received their diplomas and pins. The exercises were very successful, and splendid addresses were delivered by the speakers present. We had the pleasure of having Inspector Dunlop, from Toronto, with us on that day. The weather was not favourable for the exercises, but there was a large attendance of people both from town and the surrounding country.

During the year the greater part of the furniture was received for the New Admission Hospital. The larger part of the equipment and furniture was manufactured at the Ontario Reformatory, Guelph. On August 16th, this new building was opened for use by patients, and a large number of the medical men from this hospital district were in attendance. We held, the same day, a meeting of the Leeds and Grenville Medical Association, and the members of this society not only showed their interest by their presence, but took great interest in the proceedings. An excellent Surgical paper, read by Dr. Chabot, of Ottawa, was of particular benefit and interest to the general practitioner. Sir James Grant also gave a short paper on the use of the Neurotone in the treatment of Nerveblock. An excellent address was delivered by S. A. Armstrong, Deputy Provincial Secretary, in reference to the Aims and Ideals of the Provincial Government in the management of Hospitals for the Insane.

We had the pleasure of having with us a number of Superintendents of other Hospitals:—Doctors English, from Hamilton; Forster, Toronto; Vrooman, Cobourg; Ross, Kingston.

The female portion of the building has been occupied since that time, and is proving of great benefit in the work accomplished here. On account of the difficulty in procuring male help, we have not yet placed patients in the men's wards.

The improvements and repairs have been well kept up during the year. Our carpenters, masons and painters have had a busy year, and good results have been shown for their work.

The engineer's department has not lagged behind. Last year we reported a new boiler room having been built, and this has enabled us to have central heating. All the buildings, with the exception of the Superintendent's residence, are now heated from one boiler room, which has assisted materially in keeping all the buildings at a uniform temperature. It also eliminates a great deal of extra dust and dirt occasioned formerly by having furnaces in all the buildings.

We have also installed during the year our own electrical plant, so that the electric light used here is entirely from our own service.

The Public Works Department have started general repairs, which were very much needed, to the brick work and roofing of the Main Building.

In the Farm Department, the work has been carried on energetically. The wet season interfered greatly with the work, and the grain crop was not so heavy as the year previously, but we had a particularly good return considering the season. The hay crop was exceptionally heavy.

The Dairy Barn on the Stagg Farm, was raised and new windows put in the stable underneath, so that now we have a very commodious and well-lighted stable for the dairy herd that are placed there.

We are particularly indebted to the Clergymen of the various denominations of the town for our religious services during the year. They have been faithful in taking charge of these services, as well as in their administration to the sick.

The scarcity of men, owing to enlistment, has resulted in the staff of male attendants being very short throughout the whole year.

The Hospital staff and employees have continued to show the patriotic spirit they have always exhibited; they contributed generously to all the various funds for the amelioration of the conditions of those engaged in or affected by the war.

Dr. C. E. McLean enlisted in the 156th Battalion, and was made their Medical Officer in December of 1915. His place has been taken by Dr. M. F. D. Graham. In June last Dr. Vrooman, the Assistant Superintendent here, who had given us very valuable services, was promoted to the position of Superintendent of the new Military Hospital established at Cobourg. Dr. Kidd, acting Superintendent of the old Cobourg Hospital for the Insane, was made Assistant Superintendent here. The Medical Staff has been faithful in looking after their duties during the year.

Again thanking you for the kind counsel and advice which you have given us during the year,

I have the honour to remain, Sirs,

Your obedient servant,

J. C. MITCHELL,

Superintendent.

ANNUAL STATISTICAL REPORT OF THE OPERATIONS OF THE
HOSPITAL FOR INSANE, BROCKVILLE, FOR THE YEAR
ENDING OCTOBER 31st, 1916.

TABLE No. 1—BROCKVILLE.

Showing movements of patients in the Hospital for the official year ending October 31st, 1916.

	Male.	Female.	Total	Male.	Female.	Total.
Capacity of Hospital.....	386	378	764			
In Residence October 31st, 1915.....				371	386	757
Admitted during the year 1916:						
By Warrant.....	1	1	2			
By Medical Certificate.....	110	101	211	111	102	213
Total number under treatment during year.....				482	488	970
Discharges during year:						
As recovered.....	27	22	49			
" improved.....	23	28	51			
" unimproved.....	5	4	9			
" not insane.....						
Total number discharged during year....	55	54	109			
Died.....	29	32	61			
Deported.....	3	1	4			
Eloped.....	12		12			
Transferred.....				99	87	186
Remaining in Hospital October 31st, 1915.....				383	401	784
Total number admitted since opening of Hospital				* 1,651	1,613	3,264
Total number discharged since opening of Hospital.....	612	683	1,295			
Total number died since opening of Hospital	553	444	997			
Total number deported since opening of Hospital	13	8	21			
Total number eloped since opening of Hospital	63	2	65			
Total number transferred since opening of Hospital.....	27	75	102	1,268	1,212	2,480
Total remaining in Hospital October 31st, 1916.....				383	401	784
Daily average population.....	383.9	408.2	792.1			
Collective days' stay of all patients in residence during year.....	12,234	12,872	25,106			
Number of applications on file	8	7	15			

TABLE NO. 2—BROCKVILLE.

Showing Social State and Religion of patients admitted during the year and since opening of Hospital.

	Admissions of Year.			In residence.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
SOCIAL STATE.									
Single.....	61	49	110	156	155	311	962	751	1,713
Married.....	43	41	84	213	217	430	641	765	1,406
Widowed.....	5	11	16	12	28	40	46	94	140
Divorced.....									
Separated.....	2	1	3	2	1	3	2	3	5
Unascertained.....									
Totals.....	111	102	213	383	401	784	1,651	1,613	3,264
RELIGION.									
Baptists.....	2	3	5	13	15	28	49	42	91
Congregationalists	2	1	3	2	6	8	11	4	15
Church of England.....	18	17	35	70	79	149	302	309	611
Methodists.....	24	20	44	40	55	95	258	309	567
Presbyterians.....	26	20	46	69	57	126	313	291	604
Roman Catholics.....	35	37	72	160	163	323	618	593	1,211
Other Denominations....	3	4	7	25	20	45	63	53	116
Unascertained	1	.....	1	4	6	10	37	12	49
Total.....	111	102	213	383	401	784	1,651	1,613	3,264

TABLE No. 3—BROCKVILLE.

Showing nativity of patients admitted during the year and since opening of Hospital.

Nativity.	Admissions of Year.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Total admissions	111	102	213	1,651	1,613	3,264
Total born in Canada	91	84	175	1,330	1,329	2,659
Armenia				2	2	4
Assyria	2		2	7	3	10
Austria						
Australia						
Belgium	1		1	1		1
Bulgaria						
Central America				1		1
China				2		2
Denmark	5	8	13	97	78	175
England				6		6
France						
Finland						
Galicia		1	1	6	7	13
Germany						
Greece						
Holland						
Hungary	5	1	6	85	110	195
Ireland	2		2	6		6
Italy						
Japan						
Macedonia						
Other British Possessions				1		1
Norway						
Roumania	2	2	4	8	13	21
Russia	3	4	7	38	40	78
Scotland						
South America						
Spain				2	1	3
Sweden				3		3
Switzerland		2	2	36	23	59
United States				1		1
West Indies				19	7	26
Unascertained						
Totals	111	102	213	1,651	1,613	3,264

TABLE No. 4—BROCKVILLE.

Showing the occupation of those admitted during the year and since the opening of the Hospital

Occupation.	Admitted this year.			Since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Professional :— Clergy, Military and Naval Officers, Physicians, Lawyers, Architects, Artists, Authors, Civil Engineers, Surveyors, etc	3	.....	3	33	3	36
Commercial :— Bankers, Merchants, Accountants, Clerks, Salesmen, Stenographers, Typewriters, etc	22	2	24	148	28	176
Agricultural and Pastoral :— Farmers, Gardeners, Stock Men, etc.	20	.....	20	475	.....	475
Mechanics at Outdoor Vocations :— Railway and Stationary Engineers, Blacksmiths, Carpenters, Engine Fitters, Sawyers, Painters, Police, etc.....	9	.....	9	177	.....	177
Mechanics, etc., at Sedentary Vocations : Shoemakers, Bookbinders, Composi- tors, Weavers, Tailors, Seam- stresses, Bakers, Factory Workers, etc.....	9	2	11	99	47	146
Domestic Service :— Waiters, Cooks, Servants, etc	1	26	27	11	254	265
Education and Higher Domestic Duties :— Governesses, Teachers, Students, Housekeepers, Nurses, etc.....	4	72	76	24	1 146	1,170
Miners, Marine Engineers, Railway Em- ployees, Seamen, etc.....	4	.....	4	32	.....	32
Laborers	32	.....	32	536	.....	536
No Occupation.....	4	.....	4	68	112	180
Unascertained	3	.....	3	48	23	71
Totals	111	102	213	1,651	1,613	3,264

TABLE No. 5—BROCKVILLE.

Showing the Counties and Districts from which patients have been admitted during the year.
and since opening of Hospital.

Counties and Districts.	Admitted during year.			Admitted since opening.			Warrant cases.						Remaining in residence.		
							Admitted during year.			Admitted since opening.					
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Algoma District...				1		1				1		1			
Brant					1	1									
Bruce				4	2	6				2		2	1		1
Carleton.....	43	33	75	446	473	919		1	1	161	119	280	112	138	250
Dufferin.....															
Dundas	3	7	10	83	83	166				1		1	10	7	17
Durham.....				6	5	11								2	2
Elgin.....				4	4	8				3	1	4			
Essex.....				7	4	11				4	4	8	2	1	3
Frontenac		1	1	18	17	35				7	7	14	3	6	9
Glengarry.....	9	4	13	93	93	118				1	1	2	16	20	36
Grenville.....	4	9	13	125	135	260				1	1	2	19	24	43
Grey				3	1	4				1	1	2			
Haldimand				3		3				3		3	1		1
Halton				2		2				1		1	1		1
Hastings				13	26	39				7	17	24	4	5	9
Huron				5	3	8				3		3	2		2
Kent.....				7	1	8				4		4	2		2
Lambton				8	1	9				5	1	6	3		3
Lanark	8	13	21	162	166	328				33	22	55	35	37	72
Leeds	20	17	37	217	207	424				32	19	51	50	60	110
Lennox and Ad- dington.....				4	5	9				4	5	9	2	1	3
Lincoln.....				3	2	5				2	2	4		1	1
Middlesex.....	1		1	18	16	34				10	6	16		2	2
Muskoka District..				1		1									
Nipissing District..				3	1	4							1		1
Norfolk.....				2		2				1		1			
Northumberland ..				7	4	11				6	3	9	3		3
Ontario.....		1	1	4	9	13				4	7	11		1	1
Oxford				5	3	8				5	1	6	1		1
Temiskaming.....					1	1								1	1
Peel.....				4	2	6				2		2	1		1
Perth				6	1	7				6		6	2	1	3
Peterborough				4	2	6				4	2	6	1		1
Prescott.....	4	4	8	85	92	177				39	37	76	25	30	55
Prince Edward ...				2	3	5				1	1	2			
Rainy River Dis- trict										2	2	4			
Renfrew.....	3	2	5	20	23	43				8	5	13	5	8	13
Russell.....	3	2	5	56	53	109				3		3	19	19	38
Simcoe				7	3	10				5	2	7	2		2
Stormont.....	12	9	21	137	110	247	1		1	40	11	51	38	27	65
Thunder Bay Dis- trict				3		3							2	1	2
Victoria				2	8	10				2	7	9			
Waterloo.....				2		2				1		1			
Welland.....				3	1	4				3		3	1	1	2
Wellington				1	3	4				1		1			
Wentworth				4	5	9				3	2	5	2	1	3
York	1		1	52	42	94				43	35	78	16	7	23
Unascertained	1		1	7	2	9				1	1	2	1	1	2
Totals.....	111	102	213	1,651	1,613	3,264	1	1	2	366	322	688	383	401	784

TABLE No. 6—BROCKVILLE.

Showing the assigned Causes of Insanity in the cases admitted during year.

Causes.	Men.	Women.	Total.	Inherited Predisposition.			Un-ascertained.
				Men.	Women	Total.	
MORAL.							
Adverse Conditions (such as loss of friends, business troubles, etc.).....	7	2	9	1	.....	1	8
Mental Strain, Worry and Overwork (not included in above).....	25	27	52	14	14	28	24
Religious Excitement.....	.....	1	1	.....	.....	.....	1
Love Affairs, including seduction	2	2	4	1	1	2	2
Fright and Nervous Shock	2	6	8	1	.....	1	7
PHYSICAL.							
Alcoholism.....	8	1	9	1	1	2	7
Sexual Excess .....	.....	.....	.....	.....	.....	.....	.....
Venereal Diseases	2	.....	2	2	.....	2	.....
Masturbation .....	.....	.....	.....	.....	.....	.....	.....
Insolation .....	.....	.....	.....	.....	.....	.....	.....
Accident or Injury.....	2	.....	2	2	.....	2	.....
Pregnancy.....	.....	2	2	.....	.....	.....	2
Parturition and Puerperium .....	.....	1	1	.....	1	1	.....
Lactation .....	.....	.....	.....	.....	.....	.....	.....
Climacteric Period .....	.....	5	5	.....	3	3	2
Fevers .....	.....	.....	.....	.....	.....	.....	.....
Privation and Overwork	2	3	5	2	1	3	2
Epilepsy.....	9	2	11	3	1	4	7
Other Convulsive Diseases .....	.....	.....	.....	.....	.....	.....	.....
Diseases of Brain and Skull .....	.....	.....	.....	.....	.....	.....	.....
Senility	7	5	12	2	2	4	8
Exophthalmic Goitre .....	.....	.....	.....	.....	.....	.....	.....
Epidemic Influenza .....	.....	.....	.....	.....	.....	.....	.....
Abuse of Drugs.....	.....	1	1	.....	1	1	.....
Loss of Special Sense .....	.....	.....	.....	.....	.....	.....	.....
Uræmia .....	.....	.....	.....	.....	.....	.....	.....
Other Auto-infection.....	.....	.....	.....	.....	.....	.....	.....
Other Bodily Diseases	3	3	6	1	.....	1	5
HEREDITARY.							
Congenital Defect	9	10	19	5	6	11	8
Unascertained	33	31	64	10	12	22	42
Not Insane.....	.....	.....	.....	.....	.....	.....	.....
Totals	111	102	213	45	43	88	125

TABLE No. 7—BROCKVILLE.

Showing hereditary tendency to insanity in patients admitted during the year and since the opening of the Hospital.

	Admitted During Year.			Since Opening.		
	Male.	Female.	Total.	Male	Female.	Total.
Paternal Branch	19	14	33	206	194	400
Maternal Branch	10	14	24	174	191	365
Paternal and Maternal Branches.....	1	.....	1	64	52	116
Collateral Branches	12	13	25	221	236	457
No Hereditary Tendency	66	51	117	689	615	1,304
Unascertained	3	10	13	297	325	622
Totals.....	111	102	213	1,651	1,613	3,264

TABLE No. 8—BROCKVILLE.

Showing summary of Probational discharges during the year.

	Male.	Female.	Total.
Number Granted Probational Discharge	49	52	101
Discharged, Recovered while on Probation.....	14	17	31
“ Improved while on Probation	16	18	34
“ Unimproved while on Probation.....	1	1	2
Died while on Probation	11	11	22
Returned to Hospital	7	5	12
Absent on Probation on October 31st, 1916	49	52	101

TABLE No. 9—BROCKVILLE.

Showing the Causes of Death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died during Year.			Since Opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Specific Infectious Diseases :—						
Typhoid Fever					1	1
Influenza	1	1	2	3	2	5
Cerebro-spinal Meningitis				1	1	2
Diphtheria						
Erysipelas		1	1	3	3	6
Septicæmia				6	7	13
Dysentery				6	13	19
Syphilis					1	1
Tuberculosis	2	9	11	83	88	171
Constitutional Diseases :—						
Rheumatism					1	1
Arthritis Deformans						
Diabetes Mellitus						
Diseases of the Digestive System :—						
Mouth, salivary glands					1	1
Pharynx						
Tonsils						
Œsophagus						
Diseases of the Intestines :—						
Diseases of the Liver				5	4	9
“ “ Pancreas						
“ “ Peritoneum		2	2	5	6	11
Diseases of the Respiratory System :—						
Diseases of the Nose and Larynx				2		2
“ “ Bronchi	2		2	4	1	5
“ “ Lungs	2	2	4	23	23	46
“ “ Pleura				1	1	2
Diseases of the Circulatory System :—						
Diseases of the Pericardium						
“ “ Heart	6	4	10	47	35	82
Arterio-sclerosis	5	3	8	41	36	77
Aneurism				1		1
Diseases of the Blood and Ductless Glands :—						
Anæmia				3	2	5
Pernicious Anæmia						
Leucæmia						
Exophthalmic Goitre						
Diseases of the Genito-Urinary System ...	1		1	18	10	28
Carried forward	19	22	41	252	236	488

TABLE No. 9—BROCKVILLE—Continued.

Showing the Causes of Death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died during Year.			Since Opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
<i>Brought Forward</i>	19	22	41	252	236	488
Diseases of the Nervous System:—						
Diseases of the Nerves				1		1
“ “ Spinal Cord				2		2
“ “ Meninges					5	5
Organic Diseases of the Brain:						
(Tumor, Abscess, Embolism, Throm-						
bosis, Hæmorrhage and other gross						
lesions).....	1		1	30	17	47
Functional Nervous Diseases:						
(Paralysis Agitans, Chorea, Eclamp-				1	2	3
ia, Hysteria)	1	1	2	53	24	77
Epilepsy.....						
Mental Diseases:—						
Exhaustation of Acute Mental Disease	1	5	6	17	35	52
Exhaustation of Chronic Mental Disease				69	47	116
General Paresis	4	1	5	55	10	65
Intoxications:—						
Alcoholism						
Morphinism						
Metallic Poisoning.....						
Heat Stroke						
Debility of Old Age.....	2	2	4	51	46	97
Accident.....					1	1
Suicide				7	4	11
Surgical Diseases				2	3	5
Gynæcological Diseases						
Malignant New Growths, or Cancer	1	1	2	13	13	26
Pellagra					1	1
Totals.....	29	32	61	553	444	997

TABLE No. 10—BROCKVILLE.

Showing form of mental disease of patients admitted, discharged and died during the year.

Mental Disease.	Admitted.			Discharged.			Died.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Infection Psychoses :—									
(a) Fever Delirium .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Infection Delirium .....	.....	.....	.....	.....	.....	.....	.....	1	1
(c) Post Infection Psychoses.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Exhaustion Psychoses :—									
(a) Collapsed Delirium.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Acute Confusional Psychoses.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(c) Neurasthenia	7	1	8	6	1	7	.....	1	1
Intoxication Psychoses :—									
(a) Acute Intoxications .....	.....	1	1	1	.....	1	.....	.....	.....
(b) Chronic “ .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(a) Alcoholism (acute and chronic).....	3	1	4	2	1	3	2	.....	2
(b) Delirium Tremens .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(c) Korsakow’s Psychoses.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(d) Acute Alcoholic Hallucinosi s.....	1	.....	1	2	.....	2	1	.....	1
(e) Alcoholic Hallucinatory Dementia	2	.....	2	.....	.....	.....	.....	.....	.....
(f) “ Paranoia.....	1	.....	1	1	.....	1	.....	.....	.....
(g) “ Paresis .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(h) Morphinism .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(i) Cocainism .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Thyroigenous Psychoses :—									
(a) Mixœdematous Psychoses .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Cretinism .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dementia Præcox :—									
(a) Hebaphrenic	13	6	19	5	4	9	1	1	2
(b) Catatonic.....	16	26	42	10	12	22	.....	6	6
(c) Paranoid.....	12	14	26	2	3	5	1	4	5
General Paresis	5	1	6	2	.....	2	4	.....	4
Organic Dementias :—									
(a) Cerebral Sclerosis .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Huntingdon’s Chorea .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(c) Multiple Sclerosis.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(d) Cerebral Syphilis.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(e) Tabetic Psychoses .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(f) Arterio Sclerotic Psychoses.....	.....	.....	.....	2	.....	2	.....	1	1
(g) Cerebral Tumor, Abscess, Hæmorrhage .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Involution Psychoses :—									
(a) Melancholia	3	4	7	1	4	5	1	2	3
(b) Pre-senile Delusional Psychoses.....	.....	3	3	.....	4	4	.....	1	1
(c) Senile Dementia	11	13	24	4	6	10	13	6	19
Manic Depressive Psychoses :—									
(a) Manic States	5	11	16	7	9	16	3	6	9
(b) Depressed States	8	5	13	4	5	9	2	1	3
(c) Mixed States	2	2	4	.....	2	2	.....	.....	.....
Carried forward	89	88	177	49	51	100	28	30	58

TABLE No. 10—BROCKVILLE—Continued.

Showing form of mental disease of patients admitted, discharged and died during the year.

Mental Disease.	Admitted.			Discharged.			Died.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Brought forward	89	88	177	49	51	100	28	30	58
Paranoia									
Psychoses from Constitutional Neuroses:—									
(a) Epileptic Psychoses	10	3	13	2	2	4	1	1	2
(b) Hysterical Psychoses									
(c) Sexualis Psychopathia									
States of Deficient Mental Development:—									
(a) Imbecility	12	8	20	4	1	5			
(b) Idiocy		2	2						
Not Diagnosed									
Not Insane: Pellagra		1	1					1	1
Totals	111	102	213	55	54	109	29	32	61

TABLE No. 11—BROCKVILLE.

Periods.	Alleged duration of insanity prior to admission.	Length of residence of those remaining in Hospital on Oct. 31st, 1916.	Periods of treatment of those who were discharged re-covered during the year.	Periods of treatment of those who were discharged improved during the year.	Periods of treatment of those who were discharged unimproved during the year.	Periods of treatment of those who died during the year.
Under 1 month.....	46	19	4	4	3	11
From 1 to 2 months.....	18	12	6	7	1	2
“ 2 “ 3 “	12	19				1
“ 3 “ 4 “	10	10	3	1		4
“ 4 “ 5 “	4	11	5	2	1	
“ 5 “ 6 “	12	11	6	1		2
“ 6 “ 9 “	11	37	9	7	4	4
“ 9 “ 12 “	23	25	5	5		2
“ 12 “ 18 “	13	38	7	7		3
“ 18 months to 2 years..	11	42		4		5
“ 2 to 3 years	11	50	4	3		3
“ 3 “ 4 “	6	59		3		3
“ 4 “ 5 “	9	45		1		1
“ 5 “ 10 “	14	153		4		8
“ 10 “ 15 “	2	102		2		2
“ 15 “ 20 “	5	107				9
“ 20 years and upwards.	6	44				1
Totals.....	213	784	49	51	9	61

HOSPITAL FOR THE INSANE, HAMILTON.

EDWIN R. ROGERS, ESQ., AND W. W. DUNLOP, ESQ.,

*Inspectors of Prisons and Public Charities,
Parliament Buildings, Toronto, Ontario.*

GENTLEMEN,—In compliance with the Statutory requirements, I beg to submit the 41st annual report of this Hospital, being for the year ending October 31st, 1916.

To a considerable extent, caused by the stress of the great war, in which so many noble Canadians are participating, our admissions have been larger than during any previous year, namely 275.

Likewise our discharges have been proportionately large, i.e., 123 or 44.72 per cent. of those admitted.

Owing to the disastrous fire that occurred in the male section of Orchard House on Easter Sunday morning, April 23rd, our other wards have been very much overcrowded, as the 183 patients from this section had to be accommodated therein.

WORK DONE.

We are pleased that, owing to the liberality of your Department, Orchard House in its reconstructed condition will be as “up to date,” on the male side at least, as any hospital in the Province. Increased accommodation for attendants having been provided, all electric wires placed in conduits, tile floors laid in kitchen, pantries, bath-rooms and lavatories, and the entire plumbing and heating system renewed, and we sincerely hope that in the near future other of the buildings may be likewise changed.

The Engineering staff has done much work in the putting in of new steam mains and the reconstruction of boilers, etc., in connection with the new heating scheme, which promises so much for comfort and economy, in fact, owing to this work and the difficulty of procuring efficient qualified help, the general repairs have fallen behind considerably, and other work that we had purposed doing has been left undone.

FARM DRAINAGE.

This work has been energetically continued, and many thousands of feet of tile have been laid. The work on the main farm has been completed, but about 80 acres remains of Hickory Farm, which we trust through your liberality may be completed during the coming year.

STAFF.

We have felt proud in that four of our female staff were chosen to go forward to that excellent Military Hospital, erected and so fully equipped by the Ontario Government, at Orpington, England, and from reports received on many hands are pleased to know that they have “made good,” as we felt assured they would.

For the Military Hospital at Cobourg we were also pleased to select five graduates, who, though they would like to have joined their confrères, in England, willingly took up the work there, and will undoubtedly make a success thereof.

Available men for the several departments of the Military Service have continued to offer themselves, and it has been a very difficult matter to retain a reasonably full male staff, and those that we have had have been called upon to do more than an ordinary share of work.

Our Medical staff has, with other departments, suffered, and though we were fortunate to have two more men during the summer months than at present, we have, with the daily lectures of instruction to our nurses in the Training School, and the increased temporary sickness incident to the season, been much handicapped, and with difficulty are able to give that close individual attention to patients, which is so essential if the best results are to be obtained.

Some seventy of our staff have enlisted for "Overseas" duty, as well as four from our officers' families, and we regret to say that three of these, namely, Robert Dean, Cyril A. Deuxberry and Sidney C. Millican, have made "the supreme sacrifice"—our sincerest sympathy has been extended to the relatives of these noble men.

EXHIBITION.

We were pleased to again have charge of the display at the Canadian National Exhibition of the work done by the patients in our several Hospitals, and to note the increasing interest taken by the public in the treatment and re-educational work followed up in their care. There is no doubt that these annual displays and the presence of a medical man, assisted by a staff of capable nurses who can discuss the work, care, etc., with the many friends of present and prospective patients, are decidedly advantageous, and justify any expenditure incurred therein; however, much better results would be procured if more space for the several displays was available.

NEEDS.

From our Dairy herd we have been able to dispose of some excellent pure bred bulls of the Holstein-Friesian bred, the progeny of stock equal to any in the country. They have gone from Middlesex, Ont., in the west, to Stanbridge, Que., in the east, and numerous inquiries are being received every week regarding our offerings. We have continued to test our best pure bred cows under the regulation and supervision of the Dept. of Agriculture, Ottawa, and find that they are keeping up well and gaining for us a good name among the breeders of the Dominion, who come in considerable numbers to see them and our excellent stables.

Thanking you for the aid and advice, so readily given at all times, I am,

Your obedient servant,

W. M. ENGLISH,

Superintendent.

ANNUAL STATISTICAL REPORT OF THE OPERATIONS OF THE

HOSPITAL FOR INSANE, HAMILTON, FOR THE YEAR

ENDING OCTOBER 31st, 1916.

TABLE No. 1—HAMILTON.

Showing movements of patients in the Hospital for the official year ending October 31st, 1916.

	Male.	Female.	Total.	Male.	Female.	Total.
Capacity of Hospital.....	656	639	1,295			
In Residence October 31st, 1915.....	.....	.....	.....	668	628	1,296
Admitted during year 1915-1916:						
By Warrant.....	84	29	113			
By Medical Certificate	65	97	162	149	126	275
Total number under treatment during year 1915-1916 .....	.....	.....	.....	817	754	1,571
Discharges during year:—						
As recovered	30	18	48			
" improved	40	35	75			
" unimproved.....	3	2	5			
" not insane .....	.....	.....	.....
Total number discharged during year....	73	55	128			
Died.....	50	61	111			
Deported.....	3	.....	3			
Eloped	8	.....	8			
Transferred.....	1	.....	1	135	116	251
Remaining in Hospital October 31st, 1916. ....	.....	.....	.....	682	638	1,320
Total number admitted since opening of Hospital.....	.....	.....	.....	3,523	3,391	6,914
Total number discharged.....	1,328	1,483	2,811			
" died.....	1,131	1,006	2,137			
" deported	50	8	58			
" eloped.....	121	9	130			
" transferred.....	211	247	458	2,841	2,753	5,594
Total remaining in Hospital October 31st, 1916.....	.....	.....	.....	682	638	1,320
Daily average population.....	683	649	1,332			
Collective day's stay of all patients in residence during year.....	250,259	235,562	485,821			
Number of applications on file.....	5	9	14			

TABLE No. 2—HAMILTON.

Showing Social State and Religion of patients admitted during the year and since opening of Hospital.

	Admissions of year.			In residence Oct. 31, 1916.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
SOCIAL STATE.									
Single	477	333	810	82	41	123	1,881	1,397	3,278
Married	188	268	456	67	85	152	1,629	1,981	3,610
Widowed	17	37	54	.....	.....	.....	11	12	23
Divorced .....	.....	.....	.....	.....	.....	.....	2	1	3
Separated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Unascertained .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	682	638	1,320	149	126	275	3,523	3,391	6,914
RELIGION.									
Baptists	38	42	80	2	12	14	198	230	428
Congregationalists	7	4	11	.....	1	1	28	19	47
Church of England	115	113	228	21	24	45	655	605	1,260
Methodists	134	144	278	36	23	59	808	828	1,636
Presbyterians	120	102	222	37	24	61	657	643	1,300
Roman Catholics	144	114	258	28	17	45	630	601	1,231
Other Denominations	93	91	184	16	21	37	376	361	737
Unascertained	31	28	59	9	4	13	171	104	275
Total	682	638	1,320	149	126	275	3,523	3,391	6,914

TABLE No. 3—HAMILTON.

Showing nativity of patients admitted during the year and since opening of Hospital.

Nativity.	Admissions of Year.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Total Admissions	149	126	275	3,523	3,391	6,914
Total born in Canada	88	85	173	2,135	2,160	4,295
Armenia	1	.....	1	1	.....	1
Assyria .....	.....	.....	.....	1	.....	1
Austria	6	.....	6	14	2	16
Australia .....	.....	.....	.....	1	.....	1
Belgium .....	.....	.....	.....	.....	.....	.....
Bulgaria .....	.....	.....	.....	1	.....	1
Central America .....	.....	.....	.....	.....	.....	.....
China .....	.....	.....	.....	3	.....	3
Denmark .....	.....	.....	.....	1	.....	1
England	25	23	48	532	378	910
France .....	.....	.....	.....	2	.....	2
Finland .....	.....	.....	.....	3	1	4
Galicia	1	.....	1	3	1	4
Germany	2	1	3	7	7	14
Greece .....	.....	.....	.....	9	12	21
Holland .....	.....	1	1	1	1	2
Hungary .....	.....	.....	.....	4	3	7
Ireland	4	4	8	294	407	701
Italy	6	.....	6	23	1	24
Japan .....	.....	.....	.....	.....	.....	.....
Macedonia .....	.....	.....	.....	.....	.....	.....
Other British Possessions .....	.....	.....	.....	95	89	184
Norway	1	.....	1	1	.....	1
Roumania .....	.....	.....	.....	3	.....	3
Russia	2	3	5	19	10	29
Scotland	7	3	10	214	185	399
South America .....	.....	.....	.....	2	1	3
Spain .....	.....	.....	.....	.....	.....	.....
Sweden .....	.....	.....	.....	5	.....	5
Turkey	1	.....	1	2	.....	2
United States	2	3	5	84	86	170
Polish	3	2	5	7	2	9
Unascertained .....	.....	1	1	56	45	101
Total.....	149	126	275	3,523	3,391	6,914

TABLE No. 4—HAMILTON.

Showing the Occupation of those admitted during the year and since the opening of the Hospital.

Occupation.	Admitted this Year.			Since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Professional :— Clergy, Military and Naval Officers, Physicians, Lawyers, Architects, Artists, Authors, Civil Engineers, Surveyors, etc.....	10	.....	10	65	2	67
Commercial :— Bankers, Merchants, Accountants, Clerks, Salesmen, Stenographers, Typewriters, etc.....	18	.....	18	205	33	238
Agricultural and Pastoral :— Farmers, Gardeners, Stock Men, etc.	27	.....	27	986	3	989
Mechanics at Outdoor Vocations :— Railway and Stationary Engineers, Blacksmiths, Carpenters, Engine Fitters, Sawyers, Painters, Police, etc	17	.....	17	296	2	298
Mechanics at Sedentary Vocations :— Shoemakers, Bookbinders, Compositors, Weavers, Tailors, Seamstresses, Bakers, Factory Workers, etc.....	17	5	22	413	118	531
Domestic Service :— Waiters, Cooks, Servants, etc.....	2	3	5	17	616	633
Education and Higher Domestic Duties :— Governesses, Teachers, Students, Housekeepers, Nurses, etc.....	3	100	103	87	2,140	2,227
Miners, Marine Engineers, Railway Em- ployees, Seamen, etc	1	.....	1	44	.....	44
Laborers	44	.....	44	957	4	961
No Occupation	8	10	18	167	236	403
Unascertained	2	8	10	286	237	523
Total	149	126	275	3,523	3,391	6,914

TABLE No. 5—HAMILTON.

Showing the Counties and Districts from which patients have been admitted during the year, and since opening of Hospital.

Counties and Districts.	Admitted during year.			Admitted since opening.			Warrant Cases.						Remaining in residence.		
							Admitted during year.			Admitted since opening.					
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Quebec				1		1				1		1			
New Brunswick...				1		1				1		1	1		1
Algoma District ..	8		8	24	6	30	8		8	23	1	24	14		14
Brant	7	13	20	191	215	406	4	2	6	77	42	119	43	50	93
Bruce				8	21	29				6	8	14	1	3	4
Carleton				10	11	21				9	7	16		2	2
Dufferin.....	2	1	3	65	72	137	1	1	2	34	21	55	13	16	29
Dundas				2	3	5				2	1	3			
Durham				10	17	27				8	7	15		1	1
Elgin.....	1		1	7	7	14				3	2	5	2		2
Essex				7	1	8				4	1	5	3		3
Frontenac				28	10	38				27	3	30	7	2	9
Glengarry				5	4	9				4	1	5			
Grenville				4	3	7				4	2	6	1	1	2
Grey	12	6	18	246	190	436	3	1	4	143	68	211	69	45	114
Haldimand	7	4	11	144	138	282	4		4	65	23	88	26	27	53
Halton	3	5	8	116	117	233	1		1	47	26	73	21	19	40
Hastings.....				6	8	14				6	6	12			
Huron.....				5	14	19				2	4	6	1	1	2
Kent				7	7	14				7	1	8	1	1	2
Kenora.....				1		1							1		1
Lambton				11	5	16				9	1	10	2		2
Lanark.....				1	3	4				1	1	2			
Leeds				4	5	9				4	4	8	1		1
Lennox & Addingt'n				11	1	12				10		10			
Lincoln	4	2	6	169	178	347				93	49	142	25	25	50
Middlesex				22	14	36				11	8	19	4		4
Manitoba.....	1		1	1		1	1		1	1		1	1		1
Muskoka District .				19	3	22				11	2	13	4		4
Nipissing District.				13	12	25				7	7	14	3	6	9
Norfolk	6	5	11	135	136	271	3	2	5	17	9	26	27	26	53
Northumberland ..				27	17	44				15	8	23	2		2
Ontario.....				28	35	63				22	22	44	5	2	7
Oxford	1		1	21	19	40				14	10	24	5	1	6
Parry Sound Dist .				7	6	13				7	3	10	2	2	4
Peel.....	1		1	22	23	50				7	9	16	3	5	8
Perth				10	12	22				8	7	15	4	3	7
Peterborough	1	1	2	11	19	30	1		1	11	11	22	1		1
Prescott.....				3	7	10				3	6	9		2	2
Prince Edward ...				5	2	7				3	2	5			
Rainy River Dist..				6	1	7				6	1	7	1	1	2
Renfrew.....				5	2	7				4		4			
Russell.....					1	1					1	1		1	1
Simcoe	2	1	3	221	166	387				152	82	234	13	10	23
Stormont.....				6	3	9				5	1	6	1		1
Sudbury.....				5		5				5		5	4		4
Thunder Bay Dist.				16	11	27				11	9	20	2	6	8
Victoria				14	22	36				12	18	30	2		2
Waterloo	11	15	26	218	229	447	5	5	10	111	43	154	65	64	129
Welland	8	8	16	190	214	404	4		4	80	38	118	40	42	82
Wellington	10	10	20	298	312	610	6		6	111	44	155	60	68	128
Wentworth	62	53	115	903	857	1,760	41	18	59	331	145	476	175	181	356
York		2	2	219	224	443				178	162	340	18	24	42
Unascertained				7	2	9				2	1	3	5	1	6
Temiskaming	2		2	6		6	2		2	6		6	3		3
Saskatchewan				1	1	2									
Total	149	126	275	3,523	3,391	6,914	84	29	113	1,841	928	2,669	682	638	1320

TABLE No. 6—HAMILTON.
Showing the assigned causes of insanity in the cases admitted during year.

Causes.	Men.	Women.	Total.	Inherited Predisposition			Un-ascertained,
				Men.	Women.	Total.	
MORAL.							
Adverse Conditions (such as loss of friends, business troubles, etc.).....	10	6	16	4	5	9	7
Mental Strain, Worry and Overwork (not included in above).....	8	18	26	5	9	14	12
Religious Excitement.....	1	1	2	.....	.....	.....	2
Love Affairs, including seduction.....	.....	2	2	.....	1	1	1
Fright and Nervous Shock	3	6	9	2	3	5	4
PHYSICAL.							
Alcoholism.....	20	1	21	4	1	5	16
Sexual Excess.....	2	.....	2	.....	.....	.....	2
Venereal Diseases .....	.....	.....	.....	.....	.....	.....	.....
Masturbation.....	4	1	5	.....	.....	.....	5
Insolation .....	.....	.....	.....	.....	.....	.....	.....
Accident or Injury	2	1	3	.....	.....	.....	3
Pregnancy .....	.....	.....	.....	.....	.....	.....	.....
Parturition and Puerperium.....	.....	2	2	.....	.....	.....	2
Lactation .....	.....	.....	.....	.....	.....	.....	.....
Climacteric Period .....	.....	7	7	.....	2	2	5
Fevers.....	.....	.....	.....	.....	.....	.....	.....
Privations and Overwork	6	8	14	2	3	5	9
Epilepsy	5	5	10	1	2	3	7
Other Convulsive Diseases.....	.....	.....	.....	.....	.....	.....	.....
Diseases of Brain and Skull.....	.....	.....	.....	.....	.....	.....	.....
Senility.....	4	1	5	3	1	4	1
Exophthalmic Goitre .....	.....	.....	.....	.....	.....	.....	.....
Epidemic Influenza.....	.....	.....	.....	.....	.....	.....	.....
Abuse of Drugs	3	3	6	1	2	3	3
Loss of Special Sense .....	.....	.....	.....	.....	.....	.....	.....
Uræmia.....	.....	.....	.....	.....	.....	.....	.....
Other Auto-Infection.....	.....	.....	.....	.....	.....	.....	.....
Other Bodily Diseases.....	13	10	23	5	6	11	12
HEREDITARY.							
Congenital Defect	6	2	8	2	.....	2	6
Unascertained.....	62	52	114	18	14	32	82
Not Insane.....	.....	.....	.....	.....	.....	.....	.....
Totals.....	149	126	275	47	49	96	179

TABLE No. 7—HAMILTON.

Showing hereditary tendency to insanity in patients admitted during the year
and since the opening of the Hospital.

	Admitted During Year			Since Opening		
	Male	Female	Total	Male	Female	Total
Paternal Branch	13	12	25	100	67	167
Maternal Branch	8	20	28	83	80	163
Paternal and Maternal Branches.....		1	1	22	32	54
Collateral Branches.....	4	3	7	107	115	222
No Hereditary Tendency.....	65	54	119	364	321	685
Unascertained.....	59	36	95	374	251	625
Totals.....	149	126	275	1,050	866	1,916

TABLE No. 8—HAMILTON.

Showing summary of probational discharges during the year.

	Male.	Female.	Total.
Number Granted Probational Discharge	88	87	175
Discharged, Recovered while on Probation	20	17	37
“ Improved	31	26	57
“ Unimproved	1	1	2
Died			
Returned to Hospital.....	11	14	25
Absent on Probation on October 31st, 1916.....	25	29	54
	88	87	175

TABLE No. 9—HAMILTON.

Showing the causes of death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died during year.			Since Opening.		
	Male.	Female.	Total	Male.	Female.	Total.
Specific Infectious Diseases :—						
Typhoid Fever.....	1	.....	1	7	1	8
Influenza .....	.....	.....	.....	2	3	5
Cerebro-spinal Meningitis .....	.....	.....	.....	.....	.....	.....
Diphtheria .....	.....	.....	.....	.....	.....	.....
Erysipelas .....	.....	1	1	13	10	23
Septicæmia.....	1	.....	1	14	7	21
Dysentery	2	7	9	17	23	40
Syphilis .....	.....	.....	.....	.....	.....	.....
Tuberculosis	6	7	13	163	182	345
Jaundice .....	.....	.....	.....	1	.....	1
Constitutional Diseases :—						
Rheumatism .....	.....	.....	.....	.....	1	1
Arthritis Deformans .....	.....	.....	.....	.....	.....	.....
Diabetes Mellitus	1	.....	1	4	1	5
Diseases of the Digestive System :—						
Mouth, salivary glands.....	.....	.....	.....	1	.....	1
Pharynx .....	.....	.....	.....	.....	.....	.....
Tonsils.....	.....	.....	.....	.....	.....	.....
Esophagus .....	.....	.....	.....	.....	.....	.....
Enteritis .....	.....	.....	.....	6	13	19
Diseases of the Intestines :—Colitis.....	.....	.....	.....	.....	1	1
Diseases of the Liver.....	.....	1	1	5	10	15
“ “ Pancreas.....	.....	.....	.....	.....	1	1
“ “ Peritoneum	1	.....	1	12	8	20
Intestinal Obstruction.....	.....	.....	.....	8	3	11
Diseases of the Respiratory System :—						
Diseases of the Nose and Larynx....	.....	.....	.....	1	.....	1
“ “ Bronchi.....	.....	.....	.....	3	2	5
“ “ Lungs	4	6	10	77	48	125
“ “ Pleura.....	1	.....	1	2	2	4
Diseases of the Circulatory System :						
Diseases of the Pericardium .....	.....	.....	.....	.....	.....	.....
“ “ Heart	6	4	10	80	62	142
Arterio-sclerosis .....	.....	.....	.....	17	7	24
Aneurism .....	.....	1	1	2	1	3
Diseases of the Blood and Ductless Glands :—						
Anæmia.....	.....	.....	.....	2	5	7
Pernicious Anæmia	1	2	3	10	14	24
Leucæmia.....	.....	.....	.....	.....	.....	.....
Exophthalmic Goitre.....	.....	.....	.....	.....	.....	.....
Purpura Hæmorrhage.....	.....	.....	.....	3	3	6
Diseases of the Genito-Urinary System ..	2	.....	2	28	16	44
Carried Forward	26	29	55	478	424	902

TABLE No. 9—HAMILTON—Continued.

Showing the causes of death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died during year.			Since Opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
<i>Brought Forward</i>	26	29	55	478	424	902
Diseases of the Nervous System :—						
Diseases of the Nerves		2	2	.....	3	3
“ “ Spinal Cord.....				.....	
“ “ Meninges.....	1	.....	1	2	6	8
Organic Diseases of the Brain—						
(Tumor, Abscess, Embolism,						
Thrombosis, Hæmorrhage, and						
other gross lesions).....	1	1	2	64	67	131
Functional Nervous Diseases,						
(Paralysis Agitans, Chorea,						
Eclampsia, Hysteria).....	1	6	7	2	8	10
Epilepsy	2	5	7	94	60	154
Mental Diseases :—						
Exhaustion of Acute Mental Dis-						
ease	3	5	8	59	132	191
Exhaustion of Chronic Mental Dis-						
ease	3	4	7	78	99	177
General Paresis.....	6	.....	6	159	18	177
Intoxications :—						
Alcoholism	1	.....	1	3	.....	3
Morphinism .....	.....	.....	.....	.....	.....	.....
Metallic Poisoning.....	.....	.....	.....	.....	.....	.....
Heat Stroke .....	.....	.....	.....	.....	.....	.....
Debility of Old Age	3	7	10	143	128	271
Accident	1	.....	1	15	2	17
Suicide.....	1	.....	1	10	16	26
Surgical Diseases.....	.....	.....	.....	12	12	24
Gynæcological Diseases.....	.....	.....	.....	.....	2	2
Malignant New Growths, or Cancer	1	2	3	12	29	41
Totals	50	61	111	1,131	1,006	2,137

TABLE No. 10—HAMILTON.

Showing form of mental disease of patients admitted, discharged and died during the year.

Mental Diseases.	Admitted.			Discharged.			Died.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Infection Psychoses :—									
(a) Fever Delirium	1	1	2	2	2	4	1	1	2
(b) Infection Delirium	2	2	4	1	1	2	1	1	2
(c) Post Infection Psychoses									
Exhaustion Psychoses :—									
(a) Collapsed Delirium	3	6	9	2	2	4	1	2	3
(b) Acute Confusional Psychoses		8	8		2	2			
(c) Neurasthenia		1	1						
Intoxication Psychoses :—									
(a) Acute Intoxication					1	1			
(b) Chronic “					1	1			
(a) Alcoholism (acute and chronic)	11	2	13	10	1	11	2		2
(b) Delirium Tremens	1		1	1		1			
(c) Korsakow’s Psychoses									
(d) Acute Alcoholic Hallucinosi s				2		2			
(e) Alcoholic Hallucinatory Dementia	1		1	1		1			
(f) “ Paranoia									
(g) “ Paresis									
(h) Morphinism	1	1	2						
(i) Cocainism									
Thyroigenous Psychoses :—									
(a) Mixœdematous Psychoses									
(b) Cretinism									
Dementia Præcox :									
(a) Hebaphrenic	12	8	20	5	4	9	3	3	6
(b) Catatonic	33	31	64	14	18	32	5	7	12
(c) Paranoid	14	7	21	10	4	14	4	4	8
General Paresis	5		5				6		6
Organic Dementias :—									
(a) Cerebral Sclerosis	1	2	3	1		1			
(b) Huntingdon’s Chorea	1	1	2						
(c) Multiple Sclerosis									
(d) Cerebral Syphilis									
(e) Tabetic Psychoses				1		1	1		1
(f) Arterio Sclerotic Psychoses	3	1	4	2		2		1	1
(g) Cerebral Tumor, Abscess, Hæmorrhage ..	3	1	4						
Involution Psychoses :—									
(a) Melancholia	2	9	11	4	5	9	2	10	12
(b) Pre-senile Delusional Psychoses									
(c) Senile Dementia	13	10	23		1	1	6	6	12
Manic Depressive Psychoses :—									
(a) Manic States	9	10	19	4	3	7	8	15	23
(b) Depressed States	6	5	11	5	5	10		3	3
(c) Mixed States	4	4	8	2	2	4		1	1
Carried Forward	124	109	233	67	49	116	38	53	91

TABLE No. 10—HAMILTON—Continued.

Showing form of mental disease of patients admitted, discharged and died during the year.

Mental Diseases.	Admitted.			Discharged.			Died.		
	Male.	Female.	Total	Male.	Female.	Total.	Male.	Female.	Total.
Brought Forward.....	124	109	233	67	49	116	38	53	91
Parano a									
Psychoses from Constitutional Neuroses :—									
(a) Epileptic Psychoses	7	7	14	.....	.....	.....	4	7	11
(b) Hysterical Psychoses.....	.....	2	2	.....	2	2	.....	.....	.....
(c) Sexualis Psychopathia .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
States of Deficient Mental Development :—									
(a) Imbecility	13	8	21	4	3	7	5	.....	5
(b) Idiocy	2	.....	2	.....	.....	.....	1	.....	1
Not Diagnosed.....	2	.....	2	2	1	3	2	1	3
Not Insane	1	.....	1	.....	.....	.....	.....	.....	.....
Total	149	126	275	73	55	128	50	61	111

TABLE No. 11—HAMILTON.

Periods.	Alleged duration of insanity prior to admission.	Length of residence of those remaining in Hospital on Oct. 31st, 1916.	Periods of treatment of those who were discharged recovered during the year.	Periods of treatment of those who were discharged improved during the year.	Periods of treatment of those who were discharged unimproved during the year.	Periods of treatment of those who died during the year.
Under 1 month.....	51	61	.....	.....	1	17
From 1 to 2 months	18	32	3	2	1	1
" 2 " 3 "	23	33	1	1	.....	3
" 3 " 4 "	10	12	1	1	.....	6
" 4 " 5 "	8	18	8	4	.....	4
" 5 " 6 "	3	6	7	4	.....	4
" 6 " 9 "	16	17	12	12	1	5
" 9 " 12 "	6	12	4	8	1	3
" 12 " 18 "	26	45	6	18	1	5
" 18 months to 2 years ..	15	57	.....	1.....	.....	.....
" 2 to 3 years	29	97	3	5	.....	10
" 3 " 4 "	14	67	1	6	.....	3
" 4 " 5 "	9	84	1	3	.....	2
" 5 " 10 "	21	282	.....	3	.....	15
" 10 " 15 "	10	153	.....	1	.....	10
" 15 " 20 "	6	123	.....	.....	.....	5
" 20 years and upwards..	10	221	1	6	.....	18
Totals.....	275	1,320	48	75	5	111

ANNUAL STATISTICAL REPORT OF THE OPERATIONS OF THE
HOSPITAL FOR INSANE, KINGSTON, FOR THE YEAR
ENDING OCTOBER 31ST, 1916.

TABLE No. 1—KINGSTON.

Showing movements of patients in the Hospital for the official year ending October 31st, 1916.

	Male.	Female.	Total.	Male.	Female.	Total.
Capacity of Hospital.....	311	268	579			
In Residence, October 31st, 1915.....				309	252	561
Admitted during year 1915-1916 :						
By Warrant	6	4	10			
By Medical Certificate	63	61	124	69	65	134
Total number under treatment during year				378	317	695
Discharges during year:—						
As recovered	37	23	60			
" improved	5	7	12			
" unimproved	2	2	4			
" not insane	2		2			
Total number discharged during year.	46	32	78			
Died	19	22	41			
Deported		1	1			
Eloped	8		8			
Transferred	1		1	74	55	129
Remaining in Hospital, October 31st, 1916.....				304	262	566
Total number admitted since opening of Hospital				2,887	2,453	5,340
Total number discharged since opening of Hospital	1,326	1,171	2,497			
Total number died since opening of Hospital	909	714	1,623			
Total number deported since opening of Hospital	10	4	14			
Total number eloped since opening of Hospital	93	1	94			
Total number transferred since opening of Hospital	245	301	546	2,583	2,191	4,774
Total remaining in Hospital October 31st, 1916.....				304	262	566
Daily average population	311	252	563			
Collective days' stay of all patients in residence during year	113,784	92,231	206,015			
Number of applications on file	1	2	3			

TABLE No. 2—KINGSTON.

Showing social state and religion of patients admitted during the year and since opening of Hospital.

	Admissions of Year.			In residence.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
SOCIAL STATE.									
Single	43	25	68	230	142	372	1,674	1,073	2,747
Married.....	23	34	57	73	105	178	1,158	1,315	2,473
Widowed.....	3	6	9	1	14	15	47	58	105
Divorced.....							1	1	2
Separated.....					1	1	7	6	13
Unascertained.....									
Total.....	69	65	134	304	262	566	2,887	2,453	5,340
RELIGION.									
Baptists		1	1	6	5	11	50	44	94
Congregationalists				1		1	11	8	19
Church of England	10	16	26	47	50	97	554	474	1,028
Methodists	14	20	34	77	82	159	666	638	1,304
Presbyterians	13	6	19	37	32	69	428	390	818
Roman Catholics	17	19	36	85	77	162	880	748	1,628
Other Denominations.....	11	2	13	32	14	46	197	112	309
Unascertained.....	4	1	5	19	2	21	101	39	140
Total	69	65	1,134	304	262	566	2,887	2,453	5,340

TABLE No. 3—KINGSTON.

Showing nativity of patients admitted during the year and since opening of Hospital.

Nativity.	Admissions of year.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Total Admissions.....	69	65	134	2,887	2,453	5,340
Total born in Canada	52	57	109	2,006	1,752	3,758
Armenia						
Assyria				2		2
Austria				4		4
Australia						
Belgium.....						
Bulgaria.....						
Central America.....						
China						
Denmark.....						
England.....	5	2	7	226	152	378
France	1		1	3	1	4
Finland				1	2	3
Galicia.....					1	1
Germany.....	7		7	49	20	69
Greece						
Holland						
Hungary.....				1		1
Ireland	1	4	5	338	310	648
Italy.....				4		4
Japan.....				1		1
Macedonia.....						
Other British Possessions				6	4	10
Norway						
Roumania						
Russia	1		1	17	2	19
Scotland	1		1	98	95	193
South America				6		6
Spain						
Sweden				3		3
Turkey						
United States.....		2	2	37	33	70
West Indies				1	1	2
Unascertained	1		1	78	72	150
Other.....				6	8	14
Total	69	65	134	2,887	2,453	5,340

TABLE No. 4—KINGSTON.

Showing the occupation of those admitted during the year and since the opening of the Hospital.

Occupation.	Admitted this year.			Since Opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Professional :— Clergy, Military and Naval Officers, Physicians, Lawyers, Architects, Artists, Authors, Civil Engineers, Surveyors, etc.....	17	.....	17	98	2	100
Commercial :— Bankers, Merchants, Accountants, Clerks, Salesmen, Stenographers, Typewriters, etc.....	4	.....	4	219	6	225
Agricultural and Pastoral :— Farmers, Gardeners, Stockmen, etc.	20	.....	20	868	4	872
Mechanics at Outdoor Vocations :— Railway and Stationary Engineers, Blacksmiths, Carpenters, Engine Fitters, Sawyers, Painters, Police, etc.....	4	.....	4	277	.....	277
Mechanics, etc., at Sedentary Vocaiions:— Shoemakers, Bookbinders, Composi- tors, Weavers, Tailors, Seamstress- es, Bakers, Factory Workers, etc...	2	2	4	197	144	341
Domestic Service :— Waiters, Cooks, Servants, etc. ....	.....	10	10	27	496	523
Education and Higher Domestic Duties :— Governesses, Teachers, Students, Housekeepers, Nurses, etc.	1	44	45	37	1,328	1,365
Miners, Marine Engineers, Railway Employees, Seamen, etc.	1	.....	1	71	.....	71
Laborers :—.....	12	.....	12	789	.....	789
No Occupation :—.....	2	5	7	118	210	328
Unascertained :—.....	2	4	10	143	184	327
Other :—.....	.....	.....	.....	43	79	122
Total	69	65	134	2,887	2,453	5,340

TABLE No. 5—KINGSTON.

Showing the Counties and Districts from which patients have been admitted during the year and since opening of Hospital.

Counties and Districts.	Admitted during year.			Admitted since opening.			Warrant Cases.						Remaining in residence.		
							Admitted during year			Admitted since opening.					
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Algoma District...				4	2	6				3	2	5			
Brant				6	7	13				6	7	13			
Bruce				3	6	9				3	5	8			
Carleton.....	2		2	207	164	371				166	125	291	24	14	38
Dufferin													2		2
Dundas				37	33	70									
Durham	2	4	6	60	57	117		1	1	16	7	23	1	9	10
Elgin.....				3	4	7				3	4	7			
Essex				3	2	5				3	2	5			
Frontenac	10	19	29	584	536	1,120	2		2	172	106	278	50	69	119
Glengarry				56	53	109							5	5	10
Grenville				58	52	110							1	1	2
Grey				8	10	18				7	9	16		1	1
Haldimand				6	7	13				6	6	12			
Haliburton.....		1	1	2	2	4				2		2	1	2	3
Halton				3	2	5				2	1	3			
Hastings	11	10	21	318	268	586		1	1	135	68	203	45	43	88
Huron				6	5	11				6	5	11			
Kent				4	1	5				4		4			
Lambton		1	1	12	3	15				12	2	14		1	1
Lanark.....		1	1	126	127	253				97	87	184	7	6	13
Leeds	3	1	4	96	84	180				79	57	136	8	3	11
Lennox&Addington	4	5	9	207	187	394		1	1	96	47	143	21	18	39
Lincoln				9	7	16				9	5	14			
Middlesex				9	6	15				6	4	10	1		1
Muskoka District..				1	1	2					1	1		1	2
Nipissing District....		1	1	1	2	3					1	1	1	1	1
Norfolk				7	5	12				7	5	12			
Northumberland ..	4	7	11	157	190	347	2		2	97	66	163	40	28	68
Ontario.....		1	1	21	24	45		1	1	19	23	42	1	1	2
Oxford				14	4	18				14	3	17			
Parry Sound Dist.															
Peel.....				4	1	5				4	1	5			
Perth				10	10	20				10	9	19			
Peterborough	3	1	4	21	25	46				8	9	17	3	3	6
Prescott				48	30	78				41	24	65	1	2	3
Prince Edward ...	1	3	4	121	92	213				37	17	54	22	12	34
Rainy River Dist.				1		1				1		1			
Renfrew.....	9	9	18	227	214	441				59	22	81	36	33	69
Russell.....					2	2								1	1
Simcoe				14	12	26				13	11	24			
Stormont.....				55	48	103				111	73	184	2	2	4
Thunder Bay Dist.				1		1							1		1
Victoria				10	13	23				10	12	22	3		3
Waterloo				14	4	18				12	4	16			
Welland				8	5	13				8	5	13	1	1	2
Wellington.....				6	4	10				4	4	8			
Wentworth				18	21	39				14	13	27	1	3	4
York	1		1	56	69	125	1		1	39	50	89	9	3	12
Unascertained	1	1	2	208	50	258	1		1	30	7	37	2		2
Other Counties				8	2	10				1		1			3
Soldiers	11		11	11		11							4		4
Prisoners	7		7	18		18							7		7
Totals.....	69	65	134	2,887	2,453	5,340	6	4	10	1,372	909	2,281	304	262	566

TABLE No. 6—KINGSTON.

Showing the assigned causes of insanity in the cases admitted during year.

Causes.	Men.	Women.	Total.	Inherited Predisposition.			Unascertained.
				Men.	Women.	Total.	
MORAL.							
Adverse conditions (such as loss of friends, business troubles, etc.).....	10	13	23	.....	.....	.....	.....
Mental Strain, Worry and Overwork (not included in above).....	2	12	14	.....	.....	.....	.....
Religious Excitement.....	2	3	5	.....	.....	.....	.....
Love Affairs, including seduction	2	.....	2	.....	.....	.....	.....
Fright and Nervous Shock	4	4	8	.....	.....	.....	.....
PHYSICAL.							
Alcoholism	12	1	13	1	.....	1	.....
Sexual Excess.....	.....	.....	.....	.....	.....	.....	.....
Venereal Diseases	3	.....	3	.....	.....	.....	.....
Masturbation.....	1	.....	1	.....	.....	.....	.....
Insolation.....	4	.....	4	.....	.....	.....	.....
Accident or Injury.....	.....	.....	.....	.....	.....	.....	.....
Pregnancy .....	.....	4	4	.....	.....	.....	.....
Parturition and Puerperium .....	.....	.....	.....	.....	.....	.....	.....
Lactation.....	.....	1	1	.....	.....	.....	.....
Climacteric Period .....	.....	.....	.....	.....	.....	.....	.....
Fevers	1	.....	1	.....	.....	.....	.....
Privation and Overwork .....	.....	.....	.....	.....	.....	.....	.....
Epilepsy.....	.....	1	1	.....	1	1	.....
Other Convulsive Diseases .....	.....	.....	.....	.....	.....	.....	.....
Diseases of Brain and Skull .....	.....	.....	.....	.....	.....	.....	.....
Senility.....	3	4	7	.....	.....	.....	.....
Exophthalmic Goitre.....	.....	.....	.....	.....	.....	.....	.....
Epidemic Influenza.....	.....	.....	.....	.....	.....	.....	.....
Abuse of Drugs.....	1	1	2	.....	.....	.....	.....
Loss of Special Sense .....	.....	.....	.....	.....	.....	.....	.....
Uræmia.....	.....	1	1	.....	.....	.....	.....
Other Auto-infection.....	.....	.....	.....	.....	.....	.....	.....
Other Bodily Diseases	1	2	3	.....	.....	.....	.....
HEREDITARY. ....	.....	.....	.....	11	22	33	.....
Congenital Defect	4	.....	4	.....	.....	.....	.....
Unascertained.....	17	18	35	57	42	99	.....
Not Insane	2	.....	2	.....	.....	.....	.....
Totals.....	69	65	134	69	65	134	.....

TABLE No. 7—KINGSTON.

Showing hereditary tendency to insanity in patients admitted during the year and since the opening of the Hospital.

	Admitted during year.			Since 1908.		
	Male.	Female.	Total.	Male.	Female.	Total.
Paternal Branch.....	16	13	29	106	98	204
Maternal Branch	1	16	17	64	78	142
Paternal and Maternal Branches				13	11	24
Collateral Branches.....	3	4	7	50	52	102
No Hereditary Tendency				58	37	95
Unascertained.....	47	32	79	362	244	606
Not Insane.....	2		2	8	.....	8
Totals	69	65	134	661	520	1,181

TABLE No. 8—KINGSTON.

Showing summary of Probational discharges during the year.

	Male.	Female.	Total.
Number granted probational discharge	19	31	50
Discharged, Recovered while on probation	12	18	30
“ Improved “	2	4	6
“ Unimproved “			
Died	5	6	11
Returned to Hospital		3	3
Absent on Probation on Oct. 31st, 1916.....			
	19	31	50

TABLE No. 9—KINGSTON.

Showing the causes of death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died during year.			Since 1908.		
		Female.	Total.	Male.	Female.	Total.
Specific Infectious Diseases :—						
Typhoid Fever.....				1	2	3
Influenza						
Cerebro-spinal Meningitis						
Diphtheria						
Erysipelas					1	1
Septicæmia		1	1	3	1	4
Dysentery					1	1
Syphilis				2		2
Tuberculosis	4	8	12	36	35	71
Constitutional Diseases :—						
Rheumatism						
Arthritis Deformans						
Diabetes Mellitus					1	1
Diseases of Digestive System :—						
Mouth, salivary glands.....						
Pharynx.....						
Tonsils.....						
Esophagus						
Stomach					1	1
Diseases of the Intestines		1	1	6	8	14
Diseases of the Liver	1	1	2	1	2	3
“ Pancreas				1		1
“ Peritoneum				4		4
Diseases of the Respiratory System :—						
Diseases of the Nose and Larynx						
“ Bronchi	6	3	9	6	3	9
“ Lungs.....		3	3	27	33	60
“ Pleura						
Diseases of the Circulatory System :—						
Diseases of the Pericardium					1	1
“ Heart	3	1	4	24	16	40
Arterio-sclerosi				14	4	18
Aneurism.....				1		1
Diseases of the Blood and Ductless Glands :						
Anæmia						
Pernicious Anæmia		1	1		2	2
Leucæmia						
Exophthalmic Goitre						
Adrenal Glands.....					1	1
Diseases of the Genito-Urinary System :—				3	5	8
Carried forward	14	19	33	129	117	246

TABLE No. 9—KINGSTON—*Continued.*

Showing the causes of death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died during year.			Since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
<i>Brought forward</i>	14	19	33	129	117	246
Diseases of the Nervous System;—						
Diseases of the Nerves.....				1		1
" Spinal Cord						
" Meninges						
Organic Diseases of the Brain. (Tumor, Abscess, Embolism, Throm- bosis, Hæmorrhage and other gross lesions).....	2	2	4	14	13	27
Functional Nervous Diseases, (Paralysis Agitans, Chorea, Eclamp- sia, Hysteria)				4	3	7
Epilepsy						
Mental Diseases:—				8	4	12
Exhaustion of Acute Mental Disease.....				6	5	11
" Chronic	3		3	26	2	28
General Paresis.....						
Intoxications:—						
Alcoholism				1		1
Morphinism.....						
Metallic Poisoning						
Heart Stroke						
Debility of Old Age				9	5	14
Accident.....		1	1	3	2	5
Suicide				4	1	5
Surgical Diseases					1	1
Gynæcological Diseases						
Malignant New Growths, or Cancer.....				3	16	19
Died while on Probation, cause unknown.....					1	1
Total	19	22	41	208	170	378

TABLE No. 10—KINGSTON.

Showing form of mental disease of patients admitted, discharged and died during the year.

Mental Disease.	Admitted.			Discharged.			Died.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Infection Psychoses :—									
(a) Fever Delirium.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Infection Delirium.....	.....	.....	.....	.....	.....	.....	.....	1	1
(c) Post Infection Psychoses .....	.....	.....	.....	.....	1	1	.....	.....	.....
Exhaustion Psychoses :—									
(a) Collapsed Delirium .....	.....	4	4	.....	2	2	.....	2	2
(b) Acute Confusional Psychoses.....	1	4	5	1	4	5	.....	.....	.....
(c) Neurasthenia	4	.....	4	4	1	5	.....	.....	.....
Intoxication Psychoses :—									
(a) Acute Intoxications.....	.....	1	1	.....	.....	.....	.....	.....	.....
(b) Chronic “ .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(a) Alcoholism (acute and chronic).....	7	.....	7	5	.....	5	.....	.....	.....
(b) Delirium Tremens.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(c) Korsakow’s Psychoses.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(d) Acute Alcoholic Hallucinosi s.....	5	.....	5	3	.....	3	.....	.....	.....
(e) Alcoholic Hallucinatory Dementia.....	.....	1	1	.....	.....	.....	.....	.....	.....
(f) “ Paranoia.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(g) “ Paresis .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(h) “ Morphinism	1	.....	1	1	.....	1	.....	.....	.....
(i) “ Cocainism .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Thyroigenous Psychoses :—									
(a) Mixœdematous Psychoses .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Cretinism ... ..	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dementia Præcox :—									
(a) Hebaprenic.....	14	10	24	6	3	9	.....	2	2
(b) Catatonic.....	7	6	13	2	2	4	1	.....	1
(c) Paranoid	11	11	22	8	5	13	3	3	6
General Paresis	2	.....	2	1	.....	1	2	.....	2
Organic Dementias :—									
(a) Cerebral Sclerosis.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Huntingdon’s Chorea.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(c) Multiple Sclerosis.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(d) Cerebral Syphilis .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(e) Tabetic Psychoses.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(f) Arterio Sclerotic Psychoses.....	1	.....	1	.....	.....	.....	1	.....	1
(g) Cerebral Tumor, Abscess, Hæmorrhage.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Involution Pschoses :—									
(a) Melancholia .....	.....	5	5	1	1	2	.....	1	1
(b) Pre-senile Delusional Psychoses	2	9	11	2	3	5	1	1	2
(c) Senile Dementia	3	3	6	1	.....	1	6	3	9
Manic Depressive Psychoses :—									
(a) Manic States	1	1	2	3	4	7	.....	5	5
(b) Depressed States	1	2	3	3	3	6	1	.....	1
(c) Mixed States	1	4	5	.....	.....	.....	2	1	3
Paranoia.....	.....	.....	.....	1	1	2	1	.....	1
Carried forward	61	61	122	42	30	72	18	19	37

TABLE No. 10—KINGSTON—Continued.

Showing form of mental disease of patients admitted, discharged and died during the year.

Mental Disease.	Admitted.			Discharged.			Died.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Brought forward	61	61	122	42	30	72	18	19	37
Psychoses from Constitutional Neuroses :—									
(a) Epileptic Psychoses	1	1	2	1	....	1	1	1	2
(b) Hysterical Psychoses .....	....	....	....	....	1	1	....	....	....
(c) Sexualis Psychopathia .....	....	....	....	....	....	....	....	....	....
States of Deficient Mental Development :—									
(a) Imbecility	2	1	3	....	....	....	....	1	1
(b) Idiocy .....	....	....	....	....	....	....	....	....	....
Not Diagnosed	2	2	4	1	1	2	....	1	1
Not Insane	3	....	3	2	....	2	....	....	....
Total	69	65	134	46	32	78	19	22	41

TABLE No. 11—KINGSTON.

Periods.	Alleged duration of insanity prior to admission.	Length of residence of those remaining in Hospital on 31st October, 1916.	Periods of treat- ment of those who were discharged recovered during the year.	Periods of treat- ment of those who were discharged improved during the year.	Periods of treat- ment of those who were discharged unimproved dur- ing the year.	Periods of treat- ment of those who died during the year.
Under 1 month.....	25	14	7	.....	3	3
From 1 to 2 months	9	8	3	1	.....	2
“ 2 “ 3 “	7	3	7	2	.....	.....
“ 3 “ 4 “	7	8	2	1	.....	2
“ 4 “ 5 “	3	4	6	2	.....	1
“ 5 “ 6 “	2	9	10	.....	.....	1
“ 6 “ 9 “	2	14	10	2	1	4
“ 9 “ 12 “	2	14	1	2	.....	1
“ 12 “ 18 “	8	26	4	.....	.....	1
“ 18 months to 2 years... ..	3	22	7	.....	.....	.....
“ 2 to 3 years	10	39	2	.....	.....	5
“ 3 “ 4 “	1	30	.....	1	.....	1
“ 4 “ 5 “ .....	.....	24	.....	.....	.....	3
“ 5 “ 10 “	3	72	.....	.....	.....	5
“ 10 “ 15 “	1	71	1	.....	.....	2
“ 15 “ 20 “	1	52	.....	1	.....	2
“ 20 years and upwards.. ..	4	156	.....	.....	.....	8
Not stated	46	.....	.....	.....	.....	.....
Totals.....	134	566	60	12	4	41

HOSPITAL FOR INSANE, LONDON.

To E. R. ROGERS, Esq., AND W. W. DUNLOP, Esq.,
Inspectors of Prisons and Public Charities.

SIRS,—I beg to present the forty-sixth Annual Report of the Hospital for Insane, London, for the year ending October 31, 1916.

	Male.	Female.	Total.	Male.	Female.	Total.
Capacity of Hospital.....	511	555	1,066			
In Residence, October 31st, 1915.....				544	608	1,152
Admitted during year 1916—						
By Warrant.....	30	8	38			
By Medical Certificate.....	82	98	180	112	106	218
Total under treatment during year...				656	714	1,370
Discharges during year—						
As recovered.....	35	28	63			
As improved.....	17	32	49			
As unimproved	3	3	6			
As not insane.....						
Total number discharged during year..	55	63	118			
Died	32	44	76			
Deported	2		2			
Eloped	3		3			
Transferred				92	107	199
Remaining in Hospital October 31st, 1916				564	607	1,171
Total admitted since opening of Hospital				4,001	3,682	7,683
“ discharged “ “ “ “	1,719	1,676	3,395			
“ died “ “ “ “	1,317	1,135	2,452			
“ deported “ “ “ “	15	4	19			
“ eloped “ “ “ “	140	16	156			
“ transferred “ “ “ “	246	244	490	3,437	3,075	6,512
Total remaining in Hospital October 31st, 1916				564	607	1,171
Daily average population.....	551.5	597.9	1149.5			
Collective day's stay of all patients in residence during year	201,877	218,848	420,725			
Number of applications on file	2	8	10			

The total number under treatment during the year as thirteen hundred and seventy, an increase of twelve as compared with the previous year.

During the whole period since this Hospital was established, there has been a steady increase each year in the number of patients receiving treatment. The following table shows the increase each decade, together with the discharge rate:—

1886—under treatment,	1,018;	admissions,	110;	population,	909;	discharges,	37 %
1896—	“	1,180;	“	152;	“	1,017	“ 37 %
1906—	“	1,230;	“	189;	“	1,062	“ 46 %
1916—	“	1,370;	“	218;	“	1,171	“ 54 %

It will thus be seen, that there has been a steady increase not only of those under treatment, but of admissions and of population. Fortunately there has also during the past ten years been considerable increase in the number of those discharged; otherwise our population would have been very much higher than it is at the present time.

The increased discharged rate during the past ten years has been to some extent due to the increased efforts made to study the individual patient. Our Reception Hospital, with its splendid hydro-therapeutic equipment, has been the chief factor in this very gratifying result.

We have conducted our work during the greater part of the past year under considerable difficulties. During the early months of the year a large number of our attendants enlisted in the overseas force, and many of them are now in England and France. Owing to scarcity of labour, it was very difficult to fill their places, and if it had not been for the loyalty and good spirit displayed by our old and tried Head Attendants, supervisors, and employees, the work could hardly have been carried on. In addition to this four of our Medical Staff also joined the overseas force. The first to go was Dr. Archie McCausland, and I am proud to say that since January he has been doing his duty nobly and well in the trenches in Flanders and France. In February, our Assistant Physician, Dr. W. K. Ross, exchanged places with Dr. Young, of Kingston. In March, our second Assistant Physician, Dr. Neely, became Medical Officer of the 142nd Battalion, and is now overseas. In May, our Pathologist, Dr. Fidler, entered the R.A.M.C., and was at once sent to Mesopotamia. In June, Dr. Young joined the No. 10 Stationary Hospital, and is now in England.

For several months I was obliged to carry on the work of the Hospital without any qualified assistants, but I was most fortunate in having two senior students, Mr. Campbell and Mr. Foucar, who did splendid work, and to whom I owe a deep debt of gratitude for the energy and ability they displayed during a very trying time.

Part of the month of October, I was obliged to carry on the work without any assistance whatever, and relief was obtained when Dr. Crawford was transferred from Hamilton.

In the face of the difficulties and discouragement experienced, our work for the year, judged by the usual standards, has been very successful. The total number discharged was 118, or 54 per cent. of admissions, as compared with 104, or 41 per cent. of admissions for the previous year. The number of deaths was 76, as compared with 99 the previous year, a very marked reduction.

IMPROVEMENTS DURING THE YEAR.

The completion of our splendid Assembly Hall early in the year was a matter of great importance to us. Work and recreation are the two essential methods of treatment especially in connection with the chronic patients of an Institution such as ours. The completion of this Hall enabled us to inaugurate our central dining-room for employees, which was built some years ago, but which has been used for entertainments. This room is large, well lighted and well ventilated, and is conveniently situated near the main kitchen. It contains steam carving table and a sterilizer for the dishes. The male employees are served by the cafeteria system, which is most successful in the operation.

On the 17th March a fire occurred in our Industrial Building, destroying the roof and the upper story. This has been renovated, and we have now a splendid industrial building where 100 patients can easily be employed in various manufacturing work.

At the present time, our steam heating plant is being entirely renovated. When completed, all our buildings will be heated from a central plant. This

together with increased radiation in our Main Building, is bound to be of great advantage both from the point of economy and comfort.

RELIGIOUS SERVICES.

I must once more express my deep appreciation of the unvarying attention of the different clergymen of the city of London to the spiritual needs of this Institution. Divine service is conducted each Sunday morning at 9 o'clock by one of the Protestant clergymen of the city. The Roman Catholic service is conducted every alternate Sunday afternoon by the Priest of St. Patrick's Church. These services are always attended by large and appreciative congregations.

I have the honour to be,

Your obedient servant,

W. J. ROBINSON,

Medical Superintendent.

ANNUAL STATISTICAL REPORT OF THE OPERATIONS OF THE
HOSPITAL FOR INSANE, LONDON, FOR THE YEAR
ENDING OCTOBER 31ST, 1916.

TABLE No. 1—LONDON.

Showing movements of patients in the Hospital for the official year ending October 31st, 1915.

	Male.	Female.	Total.	Male.	Female.	Total.
Capacity of Hospital	511	555	1,066			
In residence, October 31st, 1915				544	608	1,152
Admitted during year 1916:						
By Warrant	30	8	38			
By Medical Certificate.....	82	98	180	112	106	218
Total number under treatment during year				656	714	1,370
Discharges during year:						
As recovered.....	35	28	63			
" improved	17	32	49			
" unimproved	3	3	6			
" not insane.....						
Total number discharged during year....	55	63	118			
Died	32	44	76			
Deported	2		2			
Eloped	3		3			
Transferred.....				92	107	199
Remaining in Hospital, October 31st, 1916				564	607	1,171
Total number admitted since opening of Hospital				4,001	3,682	7,683
Total number discharged since opening of Hospital.....	1,719	1,676	3,395			
Total number died since opening of Hospi- tal	1,317	1,135	2,452			
Total number deported since opening of Hospital	15	4	19			
Total number eloped since opening of Hos- pital	140	16	156			
Total number transferred since opening of Hospital	246	244	490	3,437	3,075	6,512
Total remaining in Hospital, October 31st, 1916.....				564	607	1,171
Daily average population.....	551.5	597.9	1,149.5			
Collective day's stay of all patients in residence during year.....	201,877	218,848	420,725			
Number of applications on file	2	8	10			

TABLE No. 2—LONDON.

Showing social state and religion of patients admitted during the year and since opening of Hospital.

	Admissions of Year.			In residence.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
SOCIAL STATE.									
Single	67	43	110	413	311	724	2,240	1,424	3,664
Married	40	47	87	130	247	377	1,716	2,187	3,903
Widowed	4	15	19	17	46	63	42	70	112
Divorced	1	1	2	1	.....	1	1	1	2
Separated .....	.....	.....	.....	.....	.....	.....	2	.....	2
Unascertained.....	.....	.....	.....	3	3	6	.....	.....	.....
Totals	112	106	218	564	607	1,171	4,001	3,682	7,683
RELIGION.									
Baptists	6	7	13	44	39	83	275	289	564
Congregationalists .....	.....	.....	.....	4	3	7	32	29	61
Episcopalians	13	10	23	83	89	172	713	630	1,343
Methodists	30	26	56	135	173	308	955	1,007	1,962
Presbyterians	24	26	50	115	146	261	884	795	1,679
Roman Catholics	25	20	45	97	105	202	645	609	1,254
Other Denominations.....	13	16	29	68	47	115	269	200	469
Unascertained.....	1	1	2	18	5	23	228	123	351
Totals	112	106	218	564	607	1,171	4,001	3,682	7,683

TABLE No. 3—LONDON.

Showing nativity of patients admitted during the year and since opening of hospital.

Nativity.	Admissions of year.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Total admissions	112	106	218	4,001	3,682	7,683
Total born in Canada.....	86	84	170	2,558	2,396	4,954
Armenia.....				2	1	3
Assyria.....						
Austria.....						
Australia.....						
Belgium.....						
Bulgaria.....						
Central America.....				1		1
China.....					2	2
Denmark.....	9	14	23	495	388	883
England.....	2		2	5	5	10
France.....						
Finland.....						
Galicia.....				48	45	93
Germany.....						
Greece.....				2		2
Holland.....						
Hungary.....	3	3	6	375	434	809
Ireland.....				3	4	7
Italy.....						
Japan.....						
Macedonia.....				6	2	8
Other British Possessions.....						
Norway.....						
Roumania.....				6	4	10
Russia.....	8	2	10	289	224	513
Scotland.....						
South America.....						
Spain.....				6		6
Sweden.....				5		5
Turkey.....	3	3	6	119	105	224
United States.....				2	1	3
West Indies.....				79	71	150
Unascertained.....	1		1			
Totals.....	112	106	218	4,001	3,682	7,683

TABLE No. 4—LONDON.

Showing the occupation of those admitted during the year and since the opening of the Hospital.

Occupation.	Admitted this year.			Since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Professional: Clergy, Military and Naval Officers, Physicians, Lawyers, Architects, Artists, Authors, Civil Engineers, Surveyors, etc.	2	.....	2	77	25	102
Commercial: Bankers, Merchants, Accountants, Clerks, Salesmen, Stenographers, Typewriters, etc.....	5	6	11	297	46	343
Agricultural and Pastoral: Farmers, Gardeners, Stock Men, etc.	42	.....	42	1,570	121	1,691
Mechanics at Outdoor Vocations: Railway and Stationary Engineers, Carpenters, Engine Fitters, Saw- yers, Painters Police, etc.....	20	.....	20	347	.....	347
Mechanics, etc., at Sedentary Vocations: Shoemakers, Bookbinder, Composi- tors, Weavers, Tailors, Seam- stresses, Bakers, Factory Workers, etc.....	10	8	18	310	127	437
Domestic Service: Waiters, Cooks, Servants, etc.	2	11	13	24	518	542
Education and Higher Domestic Duties: Governesses, Teachers, Students, Housekeepers, Nurses, etc.	1	63	64	52	2,234	2,286
Miners Marine Engineers. Railway Em- ployees, Seamen etc.	1	.....	1	54	.....	54
Laborers.....	23	.....	23	997	1	998
No Occupation.....	5	17	22	86	263	349
Unascertained.....	1	1	2	187	347	534
Totals	112	106	218	4,001	3,682	7,683

TABLE NO. 5—LONDON.

Showing the Counties and Districts from which Patients have been admitted during the year, and since opening of Hospital.

Counties and Districts.	Admitted during year.			Admitted since Opening.			Warrant Cases.						Remaining in residence.		
							Admitted during year.			Admitted since opening.					
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Algoma District ...	1	...	1	12	7	19	...	...	...	8	2	10	2	...	2
Brant .....	...	1	1	38	37	75	...	...	...	20	12	32	2	4	6
Bruce	11	8	19	301	238	539	9	1	10	163	77	240	56	53	109
Carleton.....	...	...	...	4	7	11	...	...	...	...	2	2	...	...	...
Dufferin.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dundas.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Durham .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Elgin.....	10	12	22	279	4	553	1	...	1	78	27	105	45	41	86
Essex	10	18	28	282	254	536	1	3	4	108	62	170	45	63	108
Frontenac .....	...	...	...	...	8	13	...	...	...	...	1	1	...	...	...
Glengarry .....	...	...	...	...	...	...	...	...	...	10	9	19	...	...	...
Grenville .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Grey .....	...	...	...	20	20	40	...	...	...	11	3	14	3	2	5
Haldimand.....	...	...	...	22	24	46	...	...	...	7	3	10	...	1	1
Halton.....	...	...	...	10	7	17	...	...	...	2	5	7	...	1	1
Hastings.....	...	...	...	5	9	14	...	...	...	136	79	215	...	...	...
Huron	10	9	19	382	373	755	6	1	7	86	43	129	55	60	115
Kent	12	8	20	298	292	590	1	...	1	197	63	260	55	47	102
Lambton	15	7	22	431	328	759	2	...	2	6	2	8	58	52	110
Lanark .....	...	...	...	3	3	6	...	...	...	...	...	...	...	...	...
Leeds .....	...	...	...	...	5	5	...	...	...	...	...	...	...	...	...
Lennox & Addington	...	...	...	3	1	4	...	...	...	1	...	1	...	...	...
Lincoln.....	...	...	...	11	6	17	...	...	...	8	1	9	...	...	...
Middlesex	29	19	48	964	971	1,953	7	2	9	288	162	450	125	160	285
Muskoka District..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nipissing District..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Norfolk .....	...	1	1	34	38	72	...	...	...	23	13	36	...	...	...
Northumberland ..	...	...	...	15	10	25	...	...	...	4	2	6	...	...	...
Ontario .....	...	...	...	6	13	19	...	...	...	1	8	9	...	...	...
Oxford.....	4	5	9	331	261	592	2	...	2	154	45	199	40	47	87
Parry Sound Dis- trict.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Peel	1	...	1	5	6	11	...	...	...	3	5	8	...	...	...
Perth	6	15	21	333	286	619	1	1	2	140	76	206	54	53	107
Peterborough.....	...	...	...	1	6	7	...	...	...	1	6	7	...	...	...
Prescott.....	...	...	...	2	3	5	...	...	...	1	1	2	...	...	...
Prince Edward ....	...	...	...	1	1	2	...	...	...	...	1	1	...	...	...
Rainy River Dis- trict.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Renfrew.....	...	...	...	13	21	34	...	...	...	...	...	...	...	...	...
Russell.....	...	...	...	7	7	14	...	...	...	5	7	12	1	4	5
Simcoe .....	...	...	...	12	14	26	...	...	...	1	...	1	...	...	...
Stormont .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Thunder Bay Dis- trict.....	...	...	...	1	...	1	...	...	...	...	...	...	1	2	3
Victoria .....	...	...	...	33	22	55	...	...	...	9	9	18	...	...	...
Waterloo	1	...	1	9	7	16	...	...	...	7	7	14	1	...	1
Welland .....	...	...	...	20	16	36	...	...	...	3	5	8	...	...	...
Wellington.....	1	1	2	21	26	47	...	...	...	14	11	25	2	...	2
Wentworth .....	...	...	...	47	48	95	...	...	...	6	9	15	2	1	3
York .....	...	1	1	32	26	58	...	...	...	30	31	61	2	6	8
Unascertained	1	1	2	8	6	14	...	...	...	1	...	1	15	9	24
Totals.....	112	106	218	4,001	3,682	7,683	30	8	38	1,532	779	2,311	564	607	1171

TABLE No. 6—LONDON.

Showing the assigned causes of insanity in the cases admitted during year.

Causes.	Men.	Women.	Total.	Inherited Predisposition.			Unascertained or no Hereditary.
				Men.	Women.	Total.	
MORAL.							
Adverse Conditions (such as loss of friends, business troubles, etc.).....	2	8	10	1	2	3	5
Mental Strain, Worry and Overwork (not included in above).....	12	14	26	3	2	5	16
Religious Excitement.....		3	3				6
Love Affairs (including seduction).....		4	4		1	1	3
Fright and Nervous Shock.....	2		2				2
PHYSICAL.							
Alcoholism	8		8	1		1	7
Sexual Excess							
Venereal Diseases.....	4		4				4
Masturbation							
Insolation	1		1				1
Accident or Injury	1		1				1
Pregnancy.....							
Parturition and Puerperium		2	2		1	1	1
Lactation		1	1				
Climacteric Period.....		10	10		3	3	8
Fevers	1		1				1
Privation and Overwork.....	1		1	1		1	
Epilepsy	4	2	6				6
Other Convulsive Diseases.....							
Diseases of Brain and Skull.....	1	3	4		1	1	3
Senility	10	9	19	1	2	3	15
Exophthalmic Goitre		1	1				1
Epidemic Influenza.....							
Abuse of Drugs.....	1		1				
Loss of Special Sense.....							
Uræmia	1		1				1
Other Auto-Infection							
Other Bodily Diseases		2	2				
HEREDITARY.							
Congenital Defect.....	4	5	9				
Unascertained.....	59	42	101	21	19	40	79
Not Insane.....							
Total	112	106	218	28	31	59	159

TABLE No. 7—LONDON.

Showing hereditary tendency to insanity in patients admitted during the year and since the opening of the Hospital.

	Admitted during year.			Since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Paternal Branch.....	3	4	7	103	108	211
Maternal Branch.....	12	12	24	112	140	252
Paternal and Maternal Branches.....	6	5	11	34	44	78
Collateral Branches.....	4	8	12	293	246	539
No Hereditary Tendency.....	70	66	136	777	792	1,569
Unascertained.....	17	11	28	312	279	591
Totals.....	112	106	218	1,631	1,609	3,240

TABLE No. 8—LONDON.

Showing summary of Probational discharges during the year.

	Male.	Female.	Total.
Number Granted Discharge.....	62	63	125
Discharged, Recovered.....	28	26	54
" Improved.....	5	18	23
" Unimproved.....	1	.....	1
Died.....	1	.....	1
Returned to Hospital.....	18	12	30
Absent on Probation on Oct. 31st, 1916.....	9	7	16

TABLE No. 9—LONDON.

Showing the causes of death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died during year.			Since Opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Specific Infectious Diseases :—						
Typhoid Fever				6	3	9
Influenza		1	1	3	2	5
Cerebro-spinal Meningitis					1	1
Diphtheria						
Erysipelas	1		1	7	9	16
Septicæmia	1		1	11	11	22
Dysentery				52	67	119
Syphilis				1	1	2
Tuberculosis	5	4	9	171	208	379
Constitutional Diseases :—						
Rheumatism				1	1	2
Arthritis Deformans				1	1	2
Diabetes Mellitus				6	2	8
Diseases of the Digestive System :—						
Mouth, salivary glands						
Pharynx						
Tonsils						
Œsophagus	1		1	1		1
Diseases of the Intestines :—						
Diseases of the Liver				13	14	27
Diseases of the Pancreas				1	1	2
Diseases of the Peritoneum	1	4	5	32	26	58
Diseases of the Respiratory System :—						
Diseases of the Nose and Larynx						
“ “ Bronchi				19	12	31
“ “ Lungs	2	12	14	83	101	184
“ “ Pleura				6	1	7
Diseases of the Circulatory System :—						
Diseases of the Pericardium					1	1
“ “ Heart	2	1	3	85	84	169
Arterio-sclerosis	1	6	7	15	24	39
Aneurism				4	1	5
Diseases of the Blood and Ductless Glands :—						
Anæmia		1	1	3	4	7
Pernicious Anæmia				1	1	2
Leucæmia				1		1
Exophthalmic Goitre				1	1	2
Diseases of the Genito-Urinary System				17	7	24
Carried Forward	13	30	43	541	584	1,125

TABLE No. 9—LONDON—Continued.

Showing the causes of death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died during year.			Since Opening		
	Male.	Female.	Total.	Male.	Female.	Total.
<i>Brought Forward</i>	13	30	43	541	584	1,125
Diseases of the Nervous System:—						
Diseases of the Nerves.....				5	5	10
“ “ Spinal Cord					1	1
“ “ Meninges.....				11	7	18
Organic Diseases of the Brain, (Tumor, Abscess, Embolism, Thrombosis, Hæmorrhage and other gross lesions)	3	1	4	96	64	160
Functional Nervous Diseases, (Paralysis Agitans, Chorea, Eclampsia, Hysteria).....		1	1	28	12	40
Epilepsy	5	1	6	126	74	200
Mental Diseases:—						
Exhaustion of Acute Mental Dis- ease.....		2	2	77	65	142
Exhaustion of Chronic Mental Dis- ease	1	2	3	62	61	123
General Paresis.....	3		3	137	19	156
Intoxications:—						
Alcoholism						
Morphinism						
Metallic Poisoning.....					1	1
Heat Stroke						
Debility of Old Age	2	5	7	192	186	378
Accident	1		1	10	7	17
Suicide.....	1		1	12	9	21
Surgical Diseases.....				2	4	6
Gynæcological Diseases.....		1	1		1	1
Malignant New Growths, or Cancer	3	1	4	18	35	53
Totals	32	44	76	1,317	1,135	2,452

TABLE No. 10—LONDON.

Showing form of Mental disease of patients admitted, discharged and died during the year.

Mental Disease.	Admitted.			Discharged.			Died.		
	Male.	Female	Total.	Male.	Female	Total.	Male.	Female	Total.
Infection Psychoses :—									
(a) Fever Delirium.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Infection Delirium .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(c) Post Infection Psychoses .....	.....	1	1	.....	.....	.....	.....	.....	.....
Exhaustion Psychoses :—									
(a) Collapsed Delirium.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Acute Confusional Psychoses .....	.....	2	2	.....	1	1	.....	.....	.....
(c) Neurasthenia	2	2	4	1	2	3	.....	.....	.....
Intoxication Psychoses :—									
(a) Acute Intoxications.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Chronic “ .....	.....	.....	.....	.....	.....	.....	.....	1	1
(a) Alcoholism (acute and chronic)	5	.....	5	3	.....	3	.....	.....	.....
(b) Delirium Tremens .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(c) Korsakow’s Psychoses.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(d) Acute Alcoholic Hallucinosi s .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(e) Alcoholic Hallucinatory Dementia .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(f) “ Paranoia .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(g) “ Paresis.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(h) Morphinism.....	1	.....	1	1	.....	1	.....	.....	.....
(i) Cocainism.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Thyroigenous Psychoses :—									
(a) Mixoedematous Psychoses.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Cretinism .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dementia Præcox :—									
(a) Hebaphrenic	15	7	22	3	3	6	3	5	8
(b) Catatonic	13	19	32	10	9	19	4	4	8
(c) Paranoid.....	5	10	15	2	2	4	1	1	2
General Paresis	6	.....	6	.....	.....	.....	3	.....	3
Organic Dementias :—									
(a) Cerebral Sclerosis	1	.....	1	1	.....	1	.....	.....	.....
(b) Huntingdon’s Chorea .....	.....	.....	.....	.....	.....	.....	.....	1	1
(c) Multiple Sclerosis	1	1	2	.....	.....	.....	.....	.....	.....
(d) Cerebral Syphilis.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(e) Tabetic Psychoses .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(f) Arterio Sclerotic Psychoses.....	2	.....	2	.....	.....	.....	.....	.....	.....
(g) Cerebral Tumor, Abscess, Hæmorrhage..	.....	2	2	.....	.....	.....	.....	.....	.....
Involution Psychoses :—									
(a) Melancholia	2	11	13	3	8	11	.....	2	2
(b) Pre-senile Delusional Psychoses.....	.....	2	2	.....	1	1	.....	.....	.....
(c) Senile Dementia	11	13	24	5	2	7	5	8	13
Manic Depressive Psychoses :—									
(a) Manic States.....	22	11	33	15	15	30	.....	.....	.....
(b) Depressed States.....	6	14	20	4	12	16	1	1	2
(c) Mixed States.....	1	1	2	.....	2	2	.....	.....	.....
Carried Forward	93	106	189	48	57	105	17	23	40

TABLE No. 10—LONDON—Continued.

Showing form of mental disease of patients admitted, discharged and died during the year.

Mental Disease.	Admitted.			Discharged.			Died.		
	Male.	Female	Total.	Male.	Female	Total.	Male.	Female	Total.
<i>Brought Forward</i>	93	106	189	48	57	105	17	23	40
Paranoia									
Psychoses from Constitutional Neuroses :—	6	1	7	2	....	2	6	2	8
(a) Epileptic Psychoses		3	3	....	3	3	....	....	....
(b) Hysterical Psychoses									
(c) Sexualis Psychopathia									
States of Deficient Mental Development :—	13	6	19	5	3	8	1	3	4
(a) Imbecility									
(b) Idiocy							8	16	24
Not Diagnosed.....									
Not Insane									
Totals.....	112	106	218	55	63	118	32	44	76

TABLE No. 11—LONDON.

Periods.	Alleged duration of insanity prior to admission.	Length of residence of those remaining in Hospital on Oct. 31st, 1916.	Periods of treatment of those who were discharged re over-charged during the year.	Periods of treatment of those who were discharged improved during the year.	Periods of treatment of those who were discharged unimproved during the year.	Periods of treatment of those who died during the year.
Under 1 month	35	19	4	4	2	8
From 1 to 2 months.....	13	17	2	3	2	1
“ 2 “ 3 “	9	20	2	6	2	....
“ 3 “ 4 “	13	16	8	3	....	3
“ 4 “ 5 “	5	5	6	5	....	2
“ 5 “ 6 “	5	11	10	4	....	3
“ 6 “ 9 “	7	33	14	11	....	2
“ 9 “ 12 “	25	30	7	2	....	3
“ 12 “ 18 “	12	66	4	3	....	2
“ 18 months to 2 years..	10	15	2	2	....	2
“ 2 to 3 years.....	15	87	3	4	....	4
“ 3 “ 4 “	15	53	1	1	....	3
“ 4 “ 5 “	12	69	....	....	....	3
“ 5 “ 10 “	23	227	....	1	....	7
“ 10 “ 15 “	10	158	....	....	....	7
“ 15 “ 20 “	3	105	....	....	....	9
“ 20 years and upwards	6	250	....	....	....	17
Totals	218	1,171	63	49	6	76

HOSPITAL FOR INSANE, MIMICO.

TO EDWIN R. ROGERS, ESQ., AND WILLARD W. DUNLOP, ESQ.,
*Inspectors of Hospitals for Insane, Parliament Buildings,
 Toronto, Ont.*

SIRS,—In accordance with the requirements of the Statute, I have the honour to submit herewith the Twenty-second Annual Report of this Hospital for the year ending October 31st, 1916.

	Male.	Female.	Total.	Male.	Female.	Total.
There were in residence on October 31st, 1916				339	339	678
Admitted during the year by Warrant...	51	19	70			
Admitted during the year by Certificate .	30	56	86			
Total admitted during the year				81	75	156
Total number under treatment during year				431	409	840
Discharged during the year as recovered..	25	15	40			
Discharged during the year as improved..	17	17	34			
Discharged during the year as unimproved	1	.....	1			
Discharged during the year as not insane.	1	.....	1			
Total discharged during the year.....	44	32	76			
Number died during the year.....	25	23	48			
Number eloped during the year	5	.....	5			
Number deported during the year.....	2	.....	2			
Number transferred during the year	16	15	31			
Total number leaving the hospital during year.....				92	70	162
Total number remaining in the Hospital on October 31st, 1916.....				339	339	678

ADMISSIONS.

During the past year there were one hundred and fifty-six patients admitted to this Hospital, seventy by Warrant and eight-six by Medical Certificates. Of this number eighty-one were men and seventy-five were women. Seventy-seven were single and sixty-six were married, while five men and eight women had lost their helpmates. Of the seventy-seven single persons admitted, forty-seven were men and thirty were women, while of the sixty-six married persons admitted, exclusive of the widowed, twenty-nine were men and thirty-seven were women. Among the men an hereditary tendency could be traced in thirteen cases, and among the women it was found to exist in nineteen cases, amounting in all to about twenty per cent. of the total admissions.

Adverse conditions in life, such as loss of friends, business troubles and so forth, were believed to have been the cause in nine cases, one man and eight women, while mental strain, worry and overwork were given as causes in twelve cases, four men and eight women. One case, a man, was ascribed to alcohol, and two cases to sexual excesses and venereal disease, and in both of the cases they were men.

Of the total number admitted, fifteen were reported to have been ill for a period less than two months prior to admission, while forty-five had been ill a year or more before being sent to the hospital for treatment.

One hundred and nineteen of the total number were born in Canada, fifty-four men and sixty-five women, while thirty-seven were born in other countries, England leading with nine per cent.

DISCHARGES.

During the year one hundred and three patients were discharged from this hospital, fifty-seven men and forty-six women, and two male patients were deported, having been residents of the Province for a period less than two years. Of the total number discharged, fifty-six had been under treatment in the hospital for a period of less than one year, while all those discharged as improved, seven in number had been in residence for ten years and over.

By coincidence, exactly the number discharged, namely one hundred and three patients, represents the number allowed to go home with friends, on probation, fifty-seven men and forty-six women. Of this total number, one hundred and three, forty-seven were ultimately discharged and their names written off the Institution records, and thirty-six are still at their homes on trial. Only twenty of the total number who were given probational periods were unable to remain at their homes, and their friends were obliged to return them to the Hospital custody.

DEATHS.

During the past year forty-eight patients died at this Hospital, twenty-five men and twenty-three women. Of this whole number, twenty-nine died under the age of fifty years, five between fifty and sixty years, eleven between sixty and seventy years, and six between seventy and eighty years, and two between eighty and ninety.

Twelve per cent. of the deaths were due to Exhaustion of Acute Mania, and twenty-nine per cent. to the combined causes of Epilepsy and Tuberculosis, and about ten per cent. to Apoplexy and Senility.

TYPHOID FEVER.

It is agreeable to be able to report that there have been no cases of Typhoid Fever in this Hospital during the past year, and this happy result seems to be the consequence of inoculation along with the strictest observance of sanitary measures. Most of the occasional cases occurring during the past several years were apparently traceable to infection outside the hospital by employees, who had either recently been employed, or who had been visiting their friends in the city or elsewhere, or who had partaken of the infected gesta while temporarily absent from their duties at the hospital. It will never be possible to entirely protect the hospital population from all of the foregoing accidental sources of infection, but inoculation comes nearer to the accomplishment than any other known measure. The water supply from the lake has been most carefully observed, and samples have been frequently tested, and although colon bacilli have sometimes been present, they have never been so abundant as to make the water supply a source of great danger. Notwithstanding the comparative purity of the water, the manage-

ment has taken no chances of infection from this source, and all the water used for drinking purposes has first been raised to the boiling point before being supplied to the patients.

The installation of a new chlorination plant was at one time seriously considered as a preventive measure, but there were two serious objections which easily outweighed possible advantages. One of these serious objections was the peculiar mental condition of many of the hospital inhabitants evidenced by their delusions of suspicion and persecution. Among the commonest of the delusions of this class of patients is the one that their food or drink is poisoned, and the chlorine taste would be to them convincing proof of the soundness of their false belief in many cases, and it would suggest this delusional concept and perhaps precipitate it to many others whose mental state is on the verge of such delusions. Another practical difficulty about the chlorination plant at a hospital for insane is that one of the problems of the management of insane cases is to get them to take sufficiently large quantities of liquid to promote the elimination of the wornout products by the sluggish organs. Any unpleasant or unsavory taste added to the water would only increase the reluctance on the part of the patients to partake of the requisite amount for this necessary elimination, and consequently the daily maintenance of their physical health, and of course any impairment of the bodily health would only accentuate the symptoms of the mental illness.

Inoculation, therefore, seemed to be the only sure and safe measure of insurance, and it was accordingly adopted for both patients and employees, and every patient of susceptible age is now inoculated within a fortnight of his or her admission to the hospital, and every attendant and nurse within the first thirty days. With this measure of insurance and with the strict observance of every other sanitary precaution, there is now a sense of security in respect to the old time menace of typhoid fever.

DIFFICULTY IN MAINTAINING A STAFF.

New conditions call for new remedies, and the new conditions affecting the ranks of labour attending the war have made the task of selecting and retaining a capable staff for hospital work more difficult than at any time since confederation. Many of the best men, endowed with the best instincts, those who are healthy, honest, industrious, sober, efficient, are no longer available because of the large accession to the Canadian army, and not only each community, but each hospital staff has thus been depleted of the most desirable helpers in this work.

FARM AND GARDEN.

Weather conditions were most unfavorable during the past year for farm and garden cultivation. All the early months were attended by such frequent and heavy rains that the ground could not be prepared to receive the seeds at the proper period; and later on the entire absence of rain for several months when it was needed for the ripening of grains and fruits and roots completed the defeat of the farmer and gardener in their unremitting attempts to grow useful crops. Hay, which grew so luxuriously, was the only good crop of the year, and the samples of the grains and roots were not of average excellence.

The North Farm and the garden at this place have been extensively drained during the past year, and this good work will give greater certainty of production in future years, especially when the rainfall is heavy.

WAR CONTRIBUTION.

It is not seemly that anyone should refer to

“The high stern featured beauty
Of plain devotedness to duty”

in his own personal history, but when the members of the Hospital family make heavy sacrifices, and encounter overwhelming obstacles to give their services to their country for the liberty and freedom of the world, such duty is not disparaged by reference to it. In last year's report, three former Medical Assistant Officers of this Hospital, and over thirty male employees, were mentioned as having given themselves to the noble cause, and since then one of these men, John Neal, has paid the supreme price of his devotion. During the past year, other men have gone, and other Assistant Medical Officers have joined the colours, among these latter are Doctor Allan A. Parker, Doctor Ernal E. Bice, Doctor James Moriarty, Doctor Clair L. Douglas, and Doctor Gerald H. J. Pearson. Also one of the graduates of the Training School, Miss Jessie Milne, offered her services, and was sent to the Ontario Military Hospital, at Orpington. Those remaining on the staff, who were prevented from giving their personal services, gave liberally and most willingly in money to the various patriotic causes needing their help.

OFFICERS AND EMPLOYEES.

For various reasons, one hundred and twenty-five employees left this branch of the service during the past year, eighty-two of this number having resigned and forty-three having been dismissed. One hundred and thirteen new employees were taken on to fill the foregoing vacancies, and the work of instructing this large number in their special hospital duties was no slight matter.

On the medical staff there was an unusually large number of changes, principally on account of the greater attractions offered by the service of the military hospitals. At the end of November, 1915, Doctor Louis R. Yealland resigned to accept a position at the Hospital for Nervous and Epileptics at Queen's Square, London, and his place was filled by Doctor James Moriarty, who also resigned in June to join the staff of the Western University Base Hospital. In September, Doctor Gerald Pearson resigned to join the staff of the Base Hospital at Toronto, and the vacancies created by these resignations were filled by Doctor E. J. Lyon and Doctor A. H. Brown.

Gratefully acknowledging your consideration and counsel during the past year,

I have the honour to be, Sirs,

Your obedient servant,

N. H. BEEMER,

Medical Superintendent.

ANNUAL STATISTICAL REPORT OF THE OPERATIONS OF THE
HOSPITAL FOR INSANE, MIMICO, FOR THE YEAR
ENDING OCTOBER 31st, 1916

TABLE No. 1—MIMICO.

Showing movements of patients in the Hospital for the official year ending October 31st, 1916.

—	Male.	Female.	Total.	Male.	Female.	Total.
Capacity of Hospital	340	320	660			
In Residence October 31st, 1915				350	334	684
Admitted during year 1915-16 :—						
By Warrant	51	19	70			
By Medical Certificate.....	30	56	86	81	75	156
Total number under treatment during year				431	409	840
Discharges during year :—						
As recovered	25	15	40			
" improved	17	17	34			
" unimproved.....	1		1			
" not insane	1		1			
Total number discharged during year ...	44	32	76			
Died	25	23	48			
Deported	2		2			
Eloped	5		5			
Transferred	16	15	31	92	70	162
Remaining in Hospital October 31st, 1916.....				339	339	678
Total number admitted since opening of Hospital.....				1,862	1,705	3,567
Total number discharged since opening of Hospital	621	561	1,182			
Total number died since opening of Hospital.....	542	462	1,004			
Total number deported since opening of Hospital.....	46	9	55			
Total number eloped since opening of Hospital.....	48	1	49			
Total number transferred since opening of Hospital	266	333	599	1,523	1,366	2,889
Total remaining in Hospital October 31st, 1915.....				339	339	678
Daily average population	349.26	338.54	687.80			
Collective days' stay of all patients in residence during year	127,479	123,568	251,047			
Number of applications on fyle.....	21	19	40			

TABLE No. 2—MIMICO.

Showing social state and religion of patients admitted during the year and since opening of Hospital.

	Admissions of Year.			In residence.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
SOCIAL STATE.									
Single.....	47	30	77	241	153	394	1,145	667	1,812
Married	29	37	66	85	155	240	681	986	1,667
Widowed	5	8	13	13	20	43	36	50	86
Divorced .....	.....	.....	.....	.....	1	1	.....	2	2
Separated .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Unascertained .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	81	75	156	339	339	678	1,862	1,705	3,567
RELIGION.									
Baptists	2	1	3	7	12	19	60	75	135
Congregationalists	1	.....	1	.....	1	1	4	7	11
Church of England	19	12	31	65	65	130	375	370	745
Methodists	13	27	40	70	97	167	410	445	855
Presbyterians	13	14	27	73	69	142	362	329	691
Roman Catholics	20	18	38	76	65	141	435	357	792
Other Denominations....	10	2	12	24	14	38	146	74	220
Unascertained	3	1	4	24	16	40	70	48	118
Totals.....	81	75	156	339	339	678	1,862	1,705	3,567

TABLE No. 3—MIMICO.

Showing nativity of patients admitted during the year and since opening of Hospital.

Nativity.	Admissions of year.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Total admissions	81	75	156	1,862	1,705	3,567
Total born in Canada	54	65	119	1,227	1,172	2,399
Armenia						
Assyria	1		1	1		1
Austria	4		4	20	2	22
Australia				1		1
Belgium						
Bulgaria				1		1
Central America						
China						
Denmark				1		1
England	9	5	14	214	173	387
France				5	2	7
Finland	1		1	25	6	31
Galicia				1		1
Germany	1		1	22	8	30
Greece				1		1
Holland				1		1
Hungary		1	1		2	2
Ireland	1		1	159	186	345
Italy	1		1	12	2	14
Japan						
Macedonia				1		1
Other British Possessions				1	7	8
Norway				8	2	10
Roumania				3		3
Russia	1		1	18	9	27
Scotland	3		3	73	75	148
South America						
Spain					1	1
Sweden	1	1	2	14	11	25
Turkey						
United States	3	2	5	33	31	54
West Indies				2		2
Unascertained	1	1	2	18	16	34
Totals	81	75	156	1,862	1,705	3,567

TABLE No. 4—MIMICO.

Showing the occupation of those admitted during the year and since the opening of the Hospital.

Occupation.	Admitted this year.			Since Opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Professional :— Clergy, Military and Naval Officers, Physicians, Lawyers, Architects, Artists, Authors, Civil Engineers, Surveyors, etc	4	.....	4	71	7	78
Commercial :— Bankers, Merchants, Accountants, Clerks, Salesmen, Stenographers, Typewriters, etc	5	3	8	145	21	166
Agricultural and Pastoral :— Farmers, Gardeners, Stock Men, etc.	22	.....	22	534	.....	534
Mechanics at Outdoor Vocations :— Railway and Stationary Engineers, Blacksmiths, Carpenters, Engine Fitters, Sawyers, Painters, Police, etc	7	.....	7	184	2	186
Mechanics, etc., at Sedentary Vocations : Shoemakers, Bookbinders, Composi- tors, Weavers, Tailors. Seam- stresses, Bakers, Factory Workers, etc	3	3	6	119	58	117
Domestic Service :— Waiters, Cooks, Servants, etc.....	.....	7	7	9	229	238
Education and Higher Domestic Duties :— Governesses, Teachers, Students, Housekeepers, Nurses, etc.....	.....	55	55	23	1,173	1,196
Miners, Marine Engineers, Railway Em- ployees, Seamen, etc	7	.....	7	45	.....	45
Laborers	28	.....	28	606	2	608
No Occupation	4	7	11	63	166	229
Unascertained	1	.....	1	63	47	110
Totals	81	75	156	1,862	1,705	3,567

TABLE No. 5—MIMICO.

Showing the Counties and Districts from which patients have been admitted during the year, and since opening of Hospital.

Counties and Districts.	Admitted during year.			Admitted since opening.			Warrant cases.						Remaining in residence.		
							Admitted during year.			Admitted since opening.					
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Algoma District ..	8	5	13	73	71	144	8	3	11	60	36	96	22	16	38
Brant				7	5	12				3	1	4	1	1	2
Bruce				3	4	7				2	1	3		1	1
Carleton				10	11	21				8	6	14	1		1
Dufferin				6	3	9				2	1	3	1	1	2
Dundas				3	5	8				2	3	5	2		2
Durham ..		1	1	13	20	33				7	8	15	4	4	8
Elgin				6		6				4		4	1		1
Essex				5	2	7					1	1			
Frontenac				11	17	28				4	7	11	1		1
Glengarry				2	2	4				1		1			
Grenville				4	6	10				2	3	5			
Grey				19	17	36				12	8	20	3	5	8
Haldimand				1	1	2							1		1
Halton				6	11	17				1	2	3		3	3
Haliburton	1	1	2	4	4	8	1		1	2	2	4	1	1	2
Hastings				23	33	56				15	25	40		1	1
Huron				5	6	11				1	1	2			
Kent				4		4				4		4	1		1
Lambton				5	5	10				4	3	7			
Lanark				9	8	17				7	6	13			
Leeds				1	3	4				1	2	3			
Lennox and Ad- dington				4	5	9				3	5	8			
Lincoln	1		1	2	1	3							2		2
Manitoulin	1		1	17	10	27	1		1	9	5	14	3	5	8
Middlesex				16	6	22				8	1	9	3		3
Muskoka District .	3	4	7	55	49	104	2		2	27	13	40	6	9	15
Nipissing District.	14	15	29	162	82	244	13	7	20	127	41	168	39	31	70
Norfolk				3	4	7				2	1	3			
Northumberland ..				26	24	50				13	9	22	3		3
Ontario	10	9	19	146	160	306	6	3	9	73	41	114	25	34	59
Oxford				9	2	11				7	2	9	2		2
Parry Sound Dis- trict	4	4	8	65	48	113	2		2	39	17	56	14	16	30
Peel	2	6	8	87	89	176				34	24	58	15	21	36
Perth				9	2	11				4		4	2		2
Peterborough	7	6	13	122	152	274	4	1	5	71	41	112	26	38	64
Prescott				4	3	7				4	3	7			
Prince Edward ..				2	6	8				2	2	4		1	1
Rainy River Dis- trict	3	1	4	33	22	55	3	1	4	29	19	48	5	8	13
Renfrew				4	5	9				4	3	7			
Russell				3	1	4				3		3			
Simcoe	11	11	22	253	221	474	2	2	4	94	41	135	46	40	86
Stormont				1	2	3					1	1			
Thunder Bay Dis- trict	7	2	9	89	43	132	7	1	8	83	36	119	23	8	31
Victoria	4	4	8	141	126	267	2	1	3	95	36	131	28	30	58
Waterloo				5	2	7				3	1	4	1		1
Welland	1		1	3	2	5				2	2	4	2		2
Wellington		1	1	4	4	8					1	1	1	1	2
Wentworth					9	9					3	3		2	2
York	4	5	9	368	388	756				191	171	362	53	62	115
Unascertained				9	3	12				2	3	5	1		1
Totals	81	75	156	1,862	1,705	3,567	51	19	70	1,071	638	1,709	339	339	678

TABLE No. 6—MIMICO.

Showing the assigned causes of insanity in the cases admitted during year.

Causes.	Men.	Women.	Total.	Inherited Predisposition.			Un-ascertained.
				Men.	Women.	Total.	
MORAL.							
Adverse Conditions (such as loss of friends, business troubles, etc).....	1	8	9	1	4	5	4
Mental Strain, Worry and Overwork (not included in above).....	4	8	12	.....	3	3	9
Religious Excitement.....	2	.....	2	.....	.....	.....	2
Love Affairs, including seduction.....	1	8	9	.....	2	2	7
Fright and Nervous Shock.....	.....	3	3	.....	1	1	2
PHYSICAL.							
Alcoholism	1	.....	1	.....	.....	.....	1
Sexual Excess.....	.....	1	2	.....	1	1	1
Venereal Diseases.....	1	.....	1	.....	.....	.....	1
Masturbation.....	.....	.....	.....	.....	.....	.....	.....
Insolation	3	1	4	.....	.....	.....	4
Accident or Injury .....	.....	.....	.....	.....	.....	.....	.....
Pregnancy.....	.....	.....	.....	.....	.....	.....	.....
Parturition and Puerperium.....	.....	.....	.....	.....	.....	.....	.....
Lactation.....	.....	3	3	.....	3	2	1
Climacteric Period.....	.....	.....	.....	.....	.....	.....	.....
Fevers	1	.....	1	.....	.....	.....	1
Privation and Overwork.....	2	3	5	.....	.....	.....	5
Epilepsy .....	.....	.....	.....	.....	.....	.....	.....
Other Convulsive Diseases.....	.....	.....	.....	.....	.....	.....	.....
Diseases of Brain and Skull.....	3	.....	3	.....	.....	.....	3
Senility.....	.....	.....	.....	.....	.....	.....	.....
Exophthalmic Goitre.....	2	3	5	.....	.....	.....	5
Epidemic Influenza.....	.....	.....	.....	.....	.....	.....	.....
Abuse of Drugs.....	.....	.....	.....	.....	.....	.....	.....
Loss of Special Sense.....	.....	.....	.....	.....	.....	.....	.....
Uræmia .....	.....	.....	.....	.....	.....	.....	.....
Other Auto-infection.....	.....	3	3	.....	1	1	2
Other Bodily Diseases .....	.....	.....	.....	.....	.....	.....	.....
HEREDITARY.							
Congenital Defect	1	3	4	1	1	2	2
Unascertained	57	31	88	11	4	15	73
Not Insane.....	1	.....	1	.....	.....	.....	1
Totals.....	81	75	156	13	19	32	124

TABLE No. 7—MIMICO.

Showing hereditary tendency to insanity in patients admitted during the year.

	Admitted during year.		
	Male.	Female	Total.
Paternal Branch.....	4	3	7
Maternal Branch.....	4	5	9
Paternal and Maternal Branches	1	1	2
Collateral Branches.....	4	10	14
No Hereditary Tendency	35	37	72
Unascertained	33	19	52
Totals.....	81	75	156

TABLE No. 8—MIMICO.

Showing summary of Probational Discharges during the year.

	Male.	Female.	Total.
Number granted probational discharge	57	46	103
Discharged recovered while on probation.....	19	11	30
" Improved " " 	8	9	17
" Unimproved " " 			
Died.....			
Returned to Hospital.....	12	8	20
Absent on probation on October 31st, 1916.....	18	18	36

TABLE No 9—MIMICO.

Showing the causes of death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died during year.			Since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Specific Infectious Diseases —						
Typhoid Fever.....				5	5	10
Influenza					2	2
Cerebro-spinal Meningitis						
Diphtheria.....						
Erysipelas		1	1	3	3	6
Septicæmia.....				7	4	11
Dysentery				9	18	27
Syphilis				1		1
Tuberculosis	5	6	11	61	89	150
Constitutional Diseases :—						
Rheumatism.....				2		2
Arthritis Deformans				3	4	7
Diabetes Mellitus						
Diseases of the Digestive System :—						
Mouth, salivary glands.....						
Pharynx						
Tonsils.....						
Œsophagus.....						
Stomach.....	1	1	2	1	1	2
Diseases of the Intestines :—						
Diseases of the Liver.....				4	1	5
Diseases of the Pancreas				1	1	2
Diseases of the Peritoneum				8	7	15
Diseases of the Respiratory System :—						
Diseases of the Nose and Larynx....				1		1
Diseases of the Bronchi				1	2	3
Diseases of the Lungs	1	1	2	33	28	61
Diseases of the Pleura.....				1		1
Diseases of the Circulatory System :—						
Diseases of the Pericardium				1	1	2
Diseases of the Heart.....	3	2	5	48	43	91
Arterio-sclerosis	1		1	4	5	9
Aneurism					1	1
Diseases of the Blood and Ductless Glands :—						
Anæmia				6	7	13
Pernicious Anæmia				4		4
Leucæmia.....				1		1
Exophthalmic Goitre.....					1	1
Diseases of the Genito-Urinary System..	1	1	2	4	3	7
Carried forward	12	12	24	209	226	435

TABLE No. 9—MIMICO—*Continued.*

Showing the causes of death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died during year.			Since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
<i>Brought forward</i>	12	12	24	209	226	435
Diseases of the Nervous System:—						
Diseases of the Nerves					2	2
Diseases of the Spinal Cord	1		1	10	2	12
Diseases of the Meninges						
Organic Diseases of the Brain, (Tumor, Abscess, Embolism, Thromboids, Hæmorrhage, and other gross lesions)	1	1	2	42	30	72
Functional Nervous Diseases, (Paralysis Agitans, Chorea, Eclampsia, Hysteria)	1		1	6	2	8
Epilepsy	2	2	4	68	21	89
Mental Diseases:—						
Exhaustion of Acute Mental Dis- ease	2	3	5	48	35	83
Exhaustion of Chronic Mental Dis- ease	1		1	40	28	68
General Paresis	3	2	5	42	17	59
Intoxications:—						
Alcoholism						
Morphinism						
Metallic Poisoning						
Heat Stroke						
Debility of Old Age		2	2	59	79	138
Accident	1		1	3	3	6
Suicide				4	2	6
Surgical Diseases	1		1	2	3	5
Gynæcological Diseases						
Malignant New Growths, or Cancer		1	1	6	10	16
Unknown (died while on probation)				3	1	4
Totals	25	23	48	542	462	1,004

TABLE No. 10—MIMICO.

Showing form of mental disease of patients admitted, discharged and died during the year.

Mental Disease.	Admitted.			Discharged.			Died.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Infection Psychoses :—									
(a) Fever Delirium .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Infection Delirium.....	.....	.....	.....	.....	1	1	.....	.....	.....
(c) Post Infection Psychoses.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Exhaustion Psychoses :—									
(a) Collapsed Delirium.....	.....	.....	.....	.....	.....	.....	1	.....	.....
(b) Acute Confusional Psychoses .....	.....	.....	.....	.....	.....	.....	.....	.....	1
(c) Neurasthenia.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Intoxication Psychoses :—									
(a) Acute Intoxications.....	1	.....	1	1	.....	1	.....	.....	.....
(b) Chronic “ .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(a) Alcoholism (acute and chronic)	2	.....	2	.....	.....	.....	.....	.....	.....
(b) Delirium Tremens .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(c) Korsakow's Psychoses.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(d) Acute Alcoholic Hallucinosis	1	.....	1	1	.....	1	.....	.....	.....
(e) Alcoholic Hallucinatory Dementia .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(f) “ Paranoia .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(g) “ Paresis.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(h) Morphinism.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(i) Cocainism.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Thyroigenous Psychoses :—									
(a) Mixœdematous Psychoses.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Cretinism.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dementia Præcox :—									
(a) Hebaphrenic	4	2	6	2	2	4	1	2	3
(b) Catatonic	4	9	13	.....	2	2	4	2	6
(c) Paranoid.....	9	6	15	7	3	10	2	3	5
General Paresis	2	1	3	1	.....	1	2	2	4
Organic Dementias :—									
(a) Cerebral Sclerosis .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Huntingdon's Chorea.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(c) Multiple Sclerosis	1	.....	1	.....	.....	.....	.....	.....	.....
(d) Cerebral Syphilis.....	1	.....	1	1	.....	1	1	.....	1
(e) Tabetic Psychoses.....	1	.....	1	.....	.....	.....	.....	.....	.....
(f) Arterio Sclerotic Psychoses.....	.....	1	1	.....	.....	.....	.....	.....	.....
(g) Cerebral Tumor, Abscess, Hæmorrhage..	3	1	4	.....	.....	.....	1	.....	1
Involution Psychoses,—									
(a) Melancholia.....	.....	1	1	.....	3	3	.....	2	2
(b) Pre-senile Delusional Psychoses.....	1	1	2	1	.....	1	.....	1	1
(c) Senile Dementia	3	4	7	.....	1	1	4	1	5
Manic Depressive Psychoses :—									
(a) Manic States.....	15	10	25	12	4	16	5	1	6
(b) Depressed States.....	7	14	21	8	10	18	1	4	5
(c) Mixed States	12	15	27	6	6	12	.....	1	1
Carried Forward.....	67	65	132	40	32	72	22	19	41

TABLE No. 10—MIMICO—Continued.

Showing form of mental disease of patients admitted, discharged and died during the year.

Mental Disease.	Admitted.			Discharged.			Died.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Brought forward	67	65	132	40	32	72	22	19	41
Paranoia.....		3	3					1	1
Psychoses from Constitutional Neuroses :—									
(a) Epileptic Psychoses.....	2	3	5				2	3	5
(b) Hysterical Psychoses.....									
(c) Sexualis Psychopathia									
States of Deficient Mental Development :—									
(a) Imbecility	3	4	7	3		3			1
(b) Idiocy	1		1				1		1
Not Diagnosed.....	7		7						
Not Insane	1		1	1		1			
Totals	81	75	156	44	32	76	25	23	48

TABLE No. 11—MIMICO.

Periods.	Alleged duration of insanity prior to admission.	Length of residence of those remaining in Hospital on Oct. 31st, 1916.	Periods of treatment of those who were discharged recovered during the year.	Periods of treatment of those who were discharged improved during the year.	Periods of treatment of those who were discharged unimproved during the year.	Periods of treatment of those who died during the year.
Under 1 month	24	17	1		1	2
From 1 to 2 months.....	15	11		1		3
“ 2 “ 3 “	10	8				3
“ 3 “ 4 “	14	9	3	3		2
“ 4 “ 5 “	5	17	7			1
“ 5 “ 6 “	5	15	2	1		1
“ 6 “ 9 “	11	28	9	4		
“ 9 “ 12 “	7	13	6	7		3
“ 12 “ 18 “	8	35	7	6		2
“ 18 months to 2 years.	5	32	2	2		3
“ 2 to 3 years.....	8	56	1	2		5
“ 3 “ 4 “	6	37	1			4
“ 4 “ 5 “	4	42		1		3
“ 5 “ 10 “	7	143	1	4		6
“ 10 “ 15 “	3	87		1		1
“ 15 “ 20 “		46		1		1
“ 20 years and upwards	4	82		1		8
Unknown.....	20					
Not Insane.....					1	
Totals.....	156	678	40	34	2	48

HOSPITAL FOR INSANE, PENETANGUISHENE.

ANNUAL REPORT OF THE MEDICAL SUPERINTENDENT FOR THE YEAR ENDING
OCTOBER 31ST, 1916.

TO EDWIN R. ROGERS, ESQ., AND W. W. DUNLOP, ESQ.,

*Inspectors of Ontario Hospitals for the Insane,
Parliament Buildings, Toronto.*

GENTLEMEN,—In accordance with the Statutory requirements, I have the honour to submit the Thirteenth Annual Report of the Hospital for the Insane, Penetanguishene, for the year ending October 31st, 1916.

POPULATION.

At the beginning of the year, there were 164 male and 204 female patients in residence. During the year 14 men and 7 women died, one man eloped, and 16 men, 11 women were admitted from other Institutions, leaving us with a population of 165 men and 198 women at the end of the year.

WORK DONE.

Considering the great difficulty in getting and keeping efficient help, the general work of the Institution was performed satisfactorily. The extremely dry, hot summer necessitated extra work on farm and garden, but the produce obtained is not a true index of the work done.

The calf stable addition to barn was completed by our own staff, a garage was put up, two employees' houses and half of barn were shingled, sheds were put up at assistant engineer's and one attendant's cottage. Numerous repairs were made to cottages and papering and painting were done in all employees' houses. The engineer's staff and an additional steamfitter were kept constantly at work making changes and additions to steam, electric and water plants. A large water tank was built, which, when connections are completed, will give us much needed fire protection. A Kirker-Bender fire escape was put up with connections leading from Amusement hall and Patients' dining-room. The interior of cold storage was torn out and this building is now being transformed into what we trust will be an up-to-date kitchen. The diver found and repaired a break in the intake pipe of our local water supply.

Numerous repairs were made in all departments of the Institution.

CHURCH SERVICES.

We have again to thank the clergy of Pentanguishene for their kindness in coming in all sorts of weather and many discomforts, without remuneration, to minister to our sick and bring the glad message to our people.

STAFF.

There has been but one change in our official staff. Miss Latham was transferred to a larger field of usefulness at Brockville, and Miss Snyder was transferred from Cobourg to this Institution. Several changes occurred among the employees, but we were fortunate in filling their places with little delay. All officers, artisans and employees were faithful in the discharge of their duties.

Thanking you for counsel and support.

I have the honour to be, Sirs,

Your obedient servant,

W. T. WILSON,

Medical Superintendent.

ANNUAL STATISTICAL REPORT OF THE OPERATIONS OF THE
HOSPITAL FOR INSANE, PENETANGUISHENE, FOR THE YEAR
ENDING OCTOBER 31st, 1916

TABLE NO. 1—PENETANGUISHENE.

Showing movements of patients in the Hospital for the official year ending
October 31st, 1916.

	Male.	Female.	Total.	Male.	Female.	Total.
Capacity of Hospital.....	166	203	369			
In residence October 31st, 1915.....				164	204	368
Admitted during year 1916 :—						
By Warrant.....	15	6	21			
By Medical Certificate.....	1	5	6	16	11	27
Total number under treatment during year.....				180	215	395
Discharges during year :—						
As recovered						
As improved						
As unimproved.....						
As not insane						
Total number discharged during year....						
Died	14	17	31			
Deported						
Eloped	1		1			
Transferred						
Remaining in Hospital October 31st, 1916.....				165	198	363
Total number admitted since opening of Hospital				305	362	667
Total number discharged since opening of Hospital.....	17	22	39			
Total number died since opening of Hospital.....	92	118	210			
Total number deported since opening of Hospital.....	9		9			
Total number eloped since opening of Hospital.....	10		10			
Total number transferred since opening of Hospital.....	12	24	36			
Total remaining in Hospital October 31st, 1916				165	198	363
Daily average population	163.09	200.52	363.61			
Collective days' stay of patients in resi- dence during year	569.90	733.92	1330.82			
Number of applications on fyle....						

TABLE No. 2—PENETANGUISHENE.

Showing social state and religion of patients admitted during the year and since opening of Hospital.

	Admissions of Year.			In residence			Admissions since opening		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
SOCIAL STATE.									
Single.....	13	4	17	130	109	239	225	185	410
Married	3	6	9	35	88	123	73	168	241
Widowed		1	1	.....	1	1	.....	2	2
Divorced									
Separated									
Unascertained							7	7	14
Totals.....	16	11	27	165	198	363	305	362	667
RELIGION.									
Baptists.....	1	1	2	6	14	20	12	16	28
Congregationalists									
Church of England.....	1	3	4	23	54	77	59	89	148
Methodists.....		1	1	34	40	74	53	70	123
Presbyterians		2	2	16	18	34	38	56	94
Roman Catholics.....	7	3	10	52	45	97	76	84	160
Other Denominations.....	7	1	8	18	11	29	37	28	65
Unascertained				16	16	32	30	19	49
Totals.....	16	11	27	165	198	363	305	362	667

TABLE NO. 3—PENETANGUISHENE.

Showing nativity of patients admitted during the year and since opening of Hospital.

Nativity.	Admissions of year.			Admissions since opening		
	Male.	Female.	Total.	Male.	Female.	Total.
Total Admissions.....	16	11	27	305	362	667
Total born in Canada.....	5	7	12	164	212	376
Armenia					1	1
Assyria					2	2
Austria	1		1	3		3
Australia.....						
Belgium.....						
Bulgaria						
Central America.....						
China					1	1
Denmark						
England.....	1	3	4	49	45	94
France				1	1	2
Finland	1		1	8	2	10
Galicia				1		1
Germany	1		1	6	5	11
Greece				1		1
Holland						
Hungary						
Ireland.....	1		1	21	46	67
Italy	1		1	5	1	6
Japan						
Macedonia.....				1		1
Other British Possessions						
Norway				1		1
Roumania						
Russia	2		2	6	4	10
Scotland	1		1	10	20	30
South America						
Spain						
Sweden	2	1	3	4	2	6
Turkey.....						
United States.....				8	6	14
West Indies						
Unascertained				16	14	30
Total.....	16	11	27	305	362	667

TABLE No. 4—PENETANGUISHENE.

Showing the occupation of those admitted during the year and since the opening of the Hospital.

Occupation.	Admissions of year.			Since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Professional :— Clergy, Military and Naval Officers, Physicians, Lawyers, Architects, Artists, Authors, Civil Engineers Surveyors, etc.....				3		3
Commercial :— Bankers, Merchants, Accountants, Clerks, Salesmen Stenographers, Typewriters, etc.				4	1	5
Agricultural and Pastoral :— Farmers, Gardeners, Stockmen, etc.	2		2	68		68
Mechanics at Outdoor Vocations ;— Railway and Stationary Engineers, Blacksmiths, Carpenters, Engine Fitters, Sawyers, Painters, Police, etc.	1		1	23		23
Mechanics, etc., at Sedentary Voca- tions :— Shoemakers, Bookbinders, Com- positors, Weavers, Tailors, Seam- stresses, Bakers, Factory Workers, etc.				10	11	21
Domestic Service :— Waiters, Cooks, Servants, etc.		2	2		129	129
Education and Higher Domestic Duties :— Governesses, Teachers, Students, Housekeepers, Nurses, etc.....		6	6	6	134	140
Miners, Marine Engineers, Railway Em- ployees, Seamen, etc.....				2		2
Laborers	13		13	147	1	148
No Occupation				17	54	71
Unascertained		3	3	25	32	57
Totals	16	11	27	305	362	667

TABLE No. 5—PENETANGUISHENE.

Showing the Counties and Districts from which patients have been admitted during the year, and since opening of Hospital.

Counties and Districts.	Admitted during year.			Admitted since opening.			Warrant Cases.						Remaining in residence.		
							Admitted dur- ing year.			Admitted since opening.					
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Algoma District...	2	2	4	18	11	29	2	2	4	12	8	20	11	8	19
Brant				1	1	2							1	1	2
Bruce				1	5	6				1	3	4	1	3	4
Carleton				1	4	5				1	2	3	1	2	3
Dufferin	1		1	1	4	5	1		1	1	1	2	1	2	3
Dundas															
Durham				1	1	2									
Elgin				1	4	5				1	3	4		3	3
Essex					2	2					2	2		1	1
Frontenac					4	4				1	2	3		4	4
Glengarry															
Grenville															
Grey				14	5	19				11	4	15	6	3	9
Haldimand															
Halton				1	1	2									
Hastings				1	6	7				1	6	7	1	2	3
Huron				2	3	5				1		1	1	2	3
Kent															
Lambton				1	3	4				1	1	2		1	1
Lanark					1	1								1	1
Leeds				1	1	2					1	1		1	1
Lennox & Addington				1	6	7					5	5		3	3
Lincoln				2	2	4				2	2	4			
Middlesex				5	8	13				4	4	8	1	2	3
Muskoka District..				12	10	22				9	7	16	7	5	12
Nipissing District.	4	1	5	12	7	19	4	1	5	13	5	18	4	4	8
Norfolk					3	3								2	2
Northumberland ..				5	5	15				2	4	6	2	6	8
Ontario				16	13	29				15	6	21	10	9	19
Oxford				2	2	4				2	1	3	1	1	2
Parry Sound Dist..				6	1	7				6		6	3		3
Peel				1	4	5					2	2	1	3	4
Perth				1	3	4				1	2	3		1	1
Peterborough				6	3	9				6	3	9	4	2	6
Prescott				2	1	3				1		1	2		2
Prince Edward ...															
Rainy River Dist..	2		2	10	3	13	2		2	10	3	13	7	1	8
Renfrew				1	3	4				2	1	3		3	3
Russell															
Simcoe	2	4	6	70	90	160	1		1	28	29	57	27	42	69
Stormont					1	1					1	1		1	1
Thunder Bay Dist.	5	1	6	12	8	20	5	1	6	12	8	20	11	4	15
Victoria				7	7	14				6	6	12	3	5	8
Waterloo				2	1	3				2	1	3		1	1
Welland					2	2				1		1		1	1
Wellington				3	3	6				1		1	2	3	5
Wentworth				7	2	9				2	2	4	5	2	7
York		3	3	62	103	165		2	2	52	56	108	41	60	101
Unascertained ...				16	10	26							11	3	14
Totals	16	11	27	305	362	667	15	6	21	208	181	389	165	198	363

TABLE No. 6.—PENETANGUISHENE.

Showing the assigned Causes of Insanity in the cases admitted during the year.

Causes.	Men.	Women.	Total.	Inherited Predisposition.			Un-ascertained.
				Men.	Women.	Total.	
MORAL.							
Adverse Conditions (such as loss of friends business troubles, etc.	1	.....	1	.....	.....	.....	.....
Mental strain, Worry and Overwork (not included in above)	3	3	.....	.....	.....	.....
Religious Excitement.....
Love affairs, including seduction
Fright and Nervous Shock.....
PHYSICAL.							
Alcoholism	5	.....	5	.....	.....	.....	.....
Sexual Excess.....
Venereal Diseases.....	1	1	.....
Masturbation
Isolation
Accident or Injury	1	1	2	.....	.....	.....	.....
Pregnancy
Parturition and Puerperium	1	1	.....	.....	.....	.....
Lactation
Climacteric Period
Fevers
Privation and Overwork	1	1	.....	.....	.....	.....
Epilepsy
Other Convulsive Diseases.....
Diseases of Brain and Skull
Senility
Exophthalmic Goitre.....
Epidemic Influenza.....
Abuse of Drugs
Loss of Special Sense
Uræmia
Other Auto-infection	1	1	.....	.....	.....	.....
Other Bodily Diseases.....	1	1	.....
HEREDITARY.							
Congenital Defect	1	1	.....	.....	.....	.....
Unascertained	9	3	12	.....	.....	.....	25
Not Insane
Total	16	11	27	.....	2	2	25

TABLE No. 7—PENETANGUISHENE.

Showing hereditary tendency to insanity in patients admitted during the year and since the opening of the Hospital.

	Admitted During Year.			Since Opening.		
	Male.	Female.	Total	Male.	Female.	Total.
Paternal Branch	1	1	2	25	33	58
Maternal Branch.....	.....	1	1	17	30	47
Paternal and Maternal Branches.....	.....	1	1	5	8	13
Collateral Branches.....	1	1	2	21	22	43
No Hereditary Tendency.....	3	3	6	98	110	208
Unascertained	11	4	15	139	159	298
Totals	16	11	27	305	362	667

TABLE No. 8—PENETANGUISHENE.

Showing summary of Probational Discharges during the year.

	Male.	Female.	Total.
Number Granted Probational Discharge.....	2	2
Discharged, Recovered while on probation.....
Discharged, Improved while on probation.....
Discharged, Unimproved while on probation.....
Died while on probation.....
Returned to Hospital while on probation.....	2	2
Absent on Probation on October 31st, 1916.....

TABLE No. 9—PENETANGUISHENE.

Showing the Causes of Death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died During Year.			Since Opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Specific Infectious Diseases :—						
Typhoid Fever.....		1	1	1	1	2
Influenza					1	1
Cerebro-spinal Meningitis.....						
Diphtheria.....						
Erysipelas		1	1	1	3	4
Septicæmia	1		1	1	1	2
Dysentery.....		1	1		4	4
Syphilis.....						
Tuberculosis.....	4	4	8	15	13	28
Constitutional Diseases :—						
Rheumatism.....						
Arthritis Deformans						
Diabetes Mellitus		1	1	1	2	3
Diseases of the Digestive System :—						
Mouth, Salivary Glands						
Pharynx						
Tonsils					1	1
Œsophagus.....						
Diseases of the Intestines :—						
Diseases of the Liver.....				1	2	3
“ “ Pancreas				1		1
“ “ Peritoneum					2	2
Diseases of the Respiratory System :—						
Diseases of the Nose and Larynx.....						
“ “ Bronchi					2	2
“ “ Lungs	4	1	5	11	6	17
“ “ Pleura.....				1		1
Diseases of the Circulatory System :—						
Diseases of the Pericardium						
“ “ Heart.....	1	2	3	17	22	39
Arterio-sclerosis		1	1	2	1	3
Aneurism						
Diseases of the Blood and Ductless Glands :						
Anæmia	1		1	1	1	2
Pernicious Anæmia				1	2	3
Leucæmia						
Exophthalmic Goitre					1	1
Diseases of the Genito-Urinary System ...	2		2	8	1	9
Carried Forward	13	12	25	62	66	128

TABLE No. 9—PENETANGUISHENE—Continued.

Showing the causes of death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died During Year.			Since Opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
<i>Brought forward</i>	13	12	25	62	66	128
Diseases of the Nervous System:—					1	1
Diseases of the Nerves				1		1
“ “ Spinal Cord				1		1
“ “ Meninges						
Organic Diseases of the Brain:—						
(Tumor, Abscess, Embolism, Throm-						
bosis, Hæmorrhage and other gross						
lesions)	1		1	9	13	22
Functional Nervous Diseases						
(Paralysis Agitans, Chorea, Eclamp-					2	2
sia, Hysteria)		2	2		5	6
Epilepsy				1		
Mental Diseases:—						
Exhaustion of Acute Mental Disease..				1	2	3
“ “ Chronic “ ..		1	1		1	1
General Paresis				4	4	8
Intoxications:—						
Alcoholism				1		1
Morphinism						
Metallic Poisoning						
Heat Stroke						
Debility of Old Age		1	1	11	14	25
Accident					1	1
Suicide				1		1
Surgical Diseases					3	3
Gynæcological Diseases						
Malignant New Growths or Cancer		1	1		6	6
Totals	14	17	31	92	118	210

TABLE No. 10—PENETANGUISHENE.

Showing form of Mental Disease of patients admitted, discharged and died during the year.

Mental Disease.	Admitted.			Discharged.			Died.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Infection Psychoses :—									
(a) Fever Delirium									
(b) Infection Delirium									
(c) Post Infection Psychoses.....									
Exhaustion Psychoses :—									
(a) Collapsed Delirium.....									
(b) Acute Confusional Psychoses.....									
(c) Neurasthenia									
Intoxication Psychosis :—									
(a) Acute Intoxications									
(b) Chronic “									
(a) Alcoholism (acute and chronic)									
(b) Delirium Tremens									
(c) Korsakow's Psychosis									
(d) Acute Alcoholic Hallucinosiis									
(e) Alcoholic Hallucinatory Dementia.....									
(f) “ Paranoia.....		1	1						
(g) “ Paresis									
(h) Morphinism									
(i) Cocainism.....									
Thyroigenous Psychoses :—									
(a) Mixoedematous Psychoses									
(b) Cretinism									
Dementia Præcox :—									
(a) Hebaphrenic.....		2	2				1	1	2
(b) Catatonic.....	3	1	4					2	2
(c) Paranoid	5	1	6				1	1	2
General Paresis :—									
Organic Dementias :—									
(a) Cerebral Sclerosis									
(b) Huntingdon's Chorea								1	1
(c) Multiple Sclerosis.....									
(d) Cerebral Syphilis									
(e) Tabetic Psychoses									
(f) Arterio Sclerotic Psychoses									
(g) Cerebral Tumor, Abscess, Hæmorrhage									
Involution Psychoses :—									
(a) Melancholia							1		1
(b) Pre-Senile Delusional Psychoses									
(c) Senile Dementia								1	1
Manic Depressive Psychoses :—									
(a) Manic States	3	1	4				1	1	2
(b) Depressed States.....	2	1	3						
(c) Mixed States	2		2						
Carried forward	15	7	22				4	7	11

TABLE No. 10—PENETANGUISHENE.—Continued.

Showing form of Mental Disease of patients admitted, discharged and died during the year.

Mental Disease.	Admitted.			Discharged.			Died.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Brought forward	15	7	22	....	....	....	4	7	11
Paranoia.....	1	....	1	....	....	....	....	....	....
Psychoses from Constitutional Neuroses:—									
(a) Epileptic Psychoses .....	....	....	....	....	....	....	....	....	....
(b) Hysterical Psychoses .....	....	....	....	....	....	....	....	....	....
(c) Sexualis Psychopathia.....	....	....	....	....	....	....	....	....	....
States of Deficient Mental Development:—									
(a) Imbecility .....	....	3	3	1	....	1	2	3	5
(b) Idiocy .....	....	....	....	....	....	....	....	....	....
Not Diagnosed.....	....	1	1	....	....	....	8	7	15
Not Insane .....	....	....	....	....	....	....	....	....	....
Totals	16	11	27	1	....	1	14	17	31

TABLE No. 11—PENETANGUISHENE.

Periods.	Alleged duration of insanity prior to admission.	Length of residence of those remaining in Hospital on Oct. 31st, 1916.	Periods of treatment of those who were discharged recovered during the year.	Periods of treatment of those who were discharged im-proved during the year.	Periods of treatment of those who were discharged unim-proved during the year.	Periods of treatment of those who died during the year.
Under 1 month .....	....	12	....	....	....	....
From 1 to 2 months .....	....	....	....	....	....	....
“ 2 “ 3 “ .....	....	....	....	....	....	....
“ 3 “ 4 “ .....	....	....	....	....	....	....
“ 4 “ 5 “ .....	....	....	....	....	....	....
“ 5 “ 6 “ .....	....	....	....	....	....	....
“ 6 “ 9 “ .....	....	15	....	....	....	....
“ 9 “ 12 “ .....	....	....	....	....	....	....
“ 12 “ 18 “	8	13	....	....	....	1
“ 18 months to 2 years..	....	18	....	....	....	1
“ 2 to 3 years	7	18	....	....	....	1
“ 3 “ 4 “	4	51	....	....	....	....
“ 4 “ 5 “	1	39	....	....	....	....
“ 5 “ 10 “	3	52	....	1	....	14
“ 10 “ 15 “ .....	....	44	....	....	....	13
“ 15 “ 20 “ .....	....	48	....	....	....	1
“ 20 years and upwards .	4	53	....	....	....	....
Totals	27	363	....	1	....	31

HOSPITAL FOR THE INSANE, TORONTO.

NOVEMBER 1ST, 1916.

To E. R. ROGERS, ESQ., AND W. W. DUNLOP, ESQ.,
*Inspectors of Hospitals for Insane, etc.,
Province of Ontario.*

SIRS,—In accordance with your request, I have the honour to submit the seventy-sixth annual report of this Hospital for the year ending October 31st, 1916.

	Male.	Female.	Total.	Male.	Female.	Total.
Capacity of Hospital	426	426	852			
In Residence October 31st, 1915.....				518	544	1,062
Admitted during year 1916 :						
By Warrant	58	18	76			
By Certificate.....	142	173	315	200	191	391
Total number under treatment during year				718	735	1,453
Discharges during year, minus deports :—						
As recovered	30	59	89			
“ improved	36	38	74			
“ unimproved.....	6	.....	6			
“ not insane.....	1	.....	1			
Total number discharged during year ...	73	97	170			
Died	71	49	120			
Deported	2	4	6			
Eloped	4	2	6			
Transferred	128	3	131	278	155	433
Total remaining in Hospital Oct. 31st, 1916				440	580	1,020

The work of our Hospital has been carried on during the past year with a staff greatly reduced in numbers in practically every branch of the service. What has been accomplished reflects the greatest credit on those who remained with us. Extra duties and extra time have been cheerfully taken over so that the patients might not suffer. I can only express my hearty appreciation of this devotion to duty.

Permit me also to thank you, gentlemen, for much kind assistance.

I have the honour to be, Gentlemen,

Your obedient servant,

J. M. FORSTER,
Medical Superintendent.

ANNUAL STATISTICAL REPORT OF THE OPERATIONS OF THE
HOSPITAL FOR INSANE, TORONTO, FOR THE YEAR
ENDING OCTOBER 31st, 1916.

TABLE No. 1—TORONTO.

Showing movements of patients in the Hospital for the official year ending October 31st, 1916.

—	Male.	Female.	Total.	Male.	Fe- male.	Total.
Capacity of Hospital	426	426	852			
In Residence October 31st, 1915 .....	.....	.....	.....	518	544	1,062
Admitted during year 1916:—						
By Warrant	58	18	76			
By Medical Certificate	142	173	315	200	191	391
Total number under treatment during year .....	.....	.....	.....	718	735	1,453
Discharges during year:—						
As recovered	30	59	89			
“ improved	36	38	74			
“ unimproved	6	.....	6			
“ not insane	1	.....	1			
Total number discharged during year....	73	97	170			
Died	71	49	120			
Deported	2	4	6			
Eloped	4	2	6			
Transferred	128	3	131	278	155	433
Remaining in Hospital October 31st, 1916 .. .....	.....	.....	.....	440	580	1,020
Total number admitted since opening of Hospital .....	.....	.....	.....	6,591	6,330	12,921
Total number discharged since opening of Hospital	3,251	3,397	6,648			
Total number died since opening of Hospital	1,804	1,459	3,263			
Total number deported since opening of Hospital	113	47	160			
Total number eloped since opening of Hospital	157	26	183			
Total number transferred since opening of Hospital	826	821	1,647	6,151	5,750	11,901
Total remaining in Hospital October 31st, 1916 .....	.....	.....	.....	440	580	1,020
Daily average population	495	546	1,041			
Collective days' stay of all patients in residence during year	180,675	199,290	379,965			
Number of applications on file	12	6	18			

TABLE No. 2—TORONTO.

Showing Social State and Religion of Patients admitted during the year and since the opening of the Hospital.

	In residence.			Admissions of Year.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
SOCIAL STATE.									
Single.....	261	215	476	105	73	178	3,520	2,489	6,009
Married	150	302	452	82	88	170	2,967	3,652	6,619
Widowed	20	61	81	13	30	43	75	178	253
Divorced							1	1	2
Separated									
Unascertained	9	2	11				28	10	38
Totals	440	580	1,020	200	191	391	6,591	6,330	12,921
RELIGION.									
Baptists	10	22	32	8	9	17	178	199	377
Congregationalists	3	8	11	1		1	63	87	150
Church of England	127	164	291	48	64	112	1,880	1,746	3,626
Methodists	79	107	186	34	30	64	1,208	1,253	2,461
Presbyterians	69	111	180	32	28	60	1,345	1,327	2,672
Roman Catholics	81	89	170	33	28	61	1,179	1,106	2,285
Other Denominations	44	52	96	28	22	50	501	462	963
Unascertained	27	27	54	16	10	26	237	150	387
Totals	440	580	1,020	200	191	391	6,591	6,330	12,921

TABLE No. 3—TORONTO.

Showing Nativity of Patients admitted during the year and since opening of Hospital.

Nativity.	Admissions of Year.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Total Admissions.....	200	191	391	6,591	6,330	12,921
Total born in Canada	82	80	162	2,878	2,929	5,807
Armenia.....	1	.....	1	1	.....	1
Assyria.....	.....	.....	.....	2	.....	2
Austria.....	4	.....	4	15	6	21
Australia.....	.....	.....	.....	2	.....	2
Belgium.....	.....	.....	.....	.....	.....	.....
Bulgaria.....	.....	.....	.....	6	.....	6
Central America .....	.....	.....	.....	.....	.....	.....
China.....	1	.....	1	4	.....	4
Denmark.....	1	.....	1	2	.....	2
England.....	49	49	98	1,297	1,119	2,416
France.....	1	.....	1	2	2	4
Finland.....	.....	.....	.....	6	5	11
Galicia.....	.....	.....	.....	.....	.....	.....
Germany.....	1	1	2	12	8	20
Greece.....	1	.....	1	3	.....	3
Holland.....	.....	.....	.....	1	.....	1
Hungary.....	.....	.....	.....	.....	.....	.....
Ireland.....	9	18	27	1,194	1,232	2,426
Italy.....	5	3	8	23	4	27
Japan.....	.....	.....	.....	.....	.....	.....
Macedonia.....	1	.....	1	8	.....	8
Other British Possessions .....	.....	1	1	6	8	14
Norway.....	.....	.....	.....	1	2	3
Roumania.....	1	.....	1	2	4	6
Russia.....	13	11	24	44	38	82
Scotland.....	12	16	28	614	543	1,157
South America .....	.....	.....	.....	1	.....	1
Spain.....	1	.....	1	1	.....	1
Sweden.....	.....	.....	.....	1	3	4
Turkey.....	3	1	4	4	1	5
United States	6	3	9	218	241	459
West Indies.....	.....	.....	.....	4	4	8
Unascertained.....	8	8	16	239	181	420
Total.....	200	191	391	6,591	6,330	12,921

TABLE No. 4—TORONTO.

Showing the occupation of those admitted during the year and since the opening of the Hospital.

Occupation.	Admitted this Year.			Since Opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Professional:— Clergy, Military and Naval Officers, Physicians, Lawyers, Architects, Artists, Authors, Civil Engineers, Surveyors, etc.	5	.....	5	268	15	283
Commercial:— Bankers, Merchants, Accountants, Clerks, Salesmen, Stenographers, Typewriters, etc.	22	13	35	801	104	905
Agricultural and Pastoral:— Farmers, Gardeners, Stock Men, etc. .	11	.....	11	1,452	.....	1,452
Mechanics at Outdoor Vocations:— Railway and Stationary Engineers, Blacksmiths, Carpenters, Engine Fitters, Sawyers, Painters, Police, etc.	29	1	30	681	2	683
Mechanics, etc., at Sedentary Vocations:— Shoemakers, Bookbinders, Composi- tors, Weavers, Tailors, Seamstresses, Bakers, Factory Workers, etc.	14	11	25	560	326	886
Domestic Service:— Waiters, Cooks, Servants, etc.	4	28	32	85	1,426	1,511
Education and Higher Domestic Duties:— Governesses, Teachers, Students, Housekeepers, Nurses, etc. ....	.....	91	91	242	3,350	3,592
Miners, Marine Engineers, Railway Em- ployees, Seamen, etc.	24	.....	24	171	2	173
Laborers	63	.....	63	1,710	.....	1,710
No Occupation	14	33	47	265	706	971
Unascertained	14	14	28	356	399	755
Total	200	191	391	6,591	6,330	12,921

TABLE No. 5—TORONTO.

Showing the Counties and Districts from which Patients have been admitted during the year, and since opening of Hospital.

Counties and Districts.	Admitted during year.			Admitted since opening.			Warrant Cases.						Remaining in residence.		
							Admitted during year.			Admitted since opening.					
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Algoma District...				14	18	32				6	1	7	3	5	8
Brant				49	60	109				2	3	5		2	2
Bruce				26	15	41				5		5	1	2	3
Carleton.....				81	66	147				12	2	14	1		1
Dufferin				8	10	18				3	1	4	1	1	2
Dundas				17	16	33				3	1	4			
Durham				173	164	337				34	17	51	3	5	8
Elgin.....				33	25	58				1		1	1	1	2
Essex				18	16	34				2	3	5	1		1
Frontenac				104	75	179				23	13	36		1	1
Glengarry				30	21	51				4	2	6			
Grenville				19	17	36				5	1	6	1		1
Grey				120	95	215				58	17	75	1	1	2
Haldimand				26	26	52				5	1	6			
Halton.....				83	66	149				6	2	8		2	2
Hastings.....				116	89	205				53	27	80	2		2
Huron				67	60	127				4	1	5	3	3	6
Kent				26	23	49				6	2	8			
Lambton				30	24	54				3	2	5			
Lanark.....				51	43	94				10	6	16			
Leeds				41	36	77				6	4	10	1		1
Lennox and Ad- dington.....	1		1	27	21	48				12	1	13	2		2
Lincoln.....				101	85	186				14	10	24			
Middlesex				83	79	162				1		1	1		1
Muskoka District..				21	20	41				3	2	5		2	2
Nipissing District.				7	6	13				1	2	3	1		1
Norfolk.....				19	21	40									
Northumberland ..		1	1	149	142	291				29	11	40	6	4	10
Ontario.....	1	1	2	200	182	382				65	30	95	7	8	15
Oxford				39	40	79				4	5	9	2		2
Parry Sound Dis- trict				1	4	5							1	2	3
Peel.....	1		1	130	129	259				31	10	41	1	5	6
Perth				50	50	100				7		7			
Peterborough				103	99	202				44	15	59	5	1	6
Prescott				21	22	43				3	1	4			
Prince Edward....		1	1	26	30	56				3		3		2	2
Rainy River Dis- trict				5	4	9				4	2	6			
Renfrew.....				4	11	15							1		1
Russell.....				12	10	22				2	1	3			
Simcoe				77	70	147				26	12	38	3	7	10
Stormont.....				49	35	84				6	3	9		1	1
Thunder Bay Dis- trict				2	3	5							2		2
Victoria				143	146	289				52	26	78	3	2	5
Waterloo	1		1	55	55	110				10	4	14	4	4	8
Welland				51	51	102				6	4	10	1	3	4
Wellington				151	152	303				14	4	18	1	3	4
Wentworth				237	211	448				39	9	48	3	2	5
York	195	188	383	3,543	3,641	7,184	58	18	76	1,257	685	1,942	374	510	884
Unascertained	1		1	153	45	198				87	14	101	3	1	4
Manitoba					1	1									
Totals.....	200	191	391	6,591	6,330	12,921	58	18	76	1,971	957	2,928	440	580	1020

TABLE No. 6—TORONTO.

Showing the assigned causes of insanity in the cases admitted during year.

Causes.	Men.	Women.	Total.	Inherited Predisposition.			Un-ascertained.
				Men.	Women.	Total.	
MORAL.							
Adverse Conditions (such as loss of friends, business troubles, etc.).....							
Mental Strain, Worry and Overwork (not included in above)							
Religious Excitement							
Love affairs, including seduction							
Fright and Nervous Shock							
PHYSICAL.							
Alcoholism	18	4	22				
Sexual Excess.....							
Venereal Diseases	35	6	41				
Masturbation							
Insolation							
Accident or Injury							
Pregnancy.....							
Parturition and Puerperium							
Lactation.....							
Climacteric Period.....							
Fevers							
Privation and Overwork.....							
Epilepsy	7	3	10				
Other Convulsive Diseases.....							
Diseases of Brain and Skull							
Senility	19	21	40				
Exophthalmic Goitre.							
Epidemic Influenza.....							
Abuse of Drugs							
Loss of Special Sense							
Uræmia							
Other Auto-infection							
Other Bodily Diseases							
HEREDITARY.							
Congenital Defect	12	24	36	12	24	36	
Unascertained	108	133	247	187	167	354	
Not Insane	1		1	1		1	
Totals.....	200	191	391	200	191	391	

TABLE No. 7—TORONTO.

Showing hereditary tendency to insanity in patients admitted during the year.

	Admitted during year.		
	Male.	Female.	Total.
Paternal Branch	6	5	11
Maternal Branch	3	10	13
Paternal and Maternal Branches.....	.....	1	1
Collateral Branches	3	8	11
No Hereditary Tendency.....	.....	.....	.....
Unascertained	188	167	355
Totals	200	191	391

TABLE No. 8—TORONTO.

Showing summary of Probational discharges during the year.

	Male.	Female.	Total.
Number granted probational discharge	74	136	210
Discharged, recovered while on probation.....	18	39	57
" improved " "	16	35	51
" unimproved " "	1	.....	1
Died while on probation .....	.....	.....	.....
Returned to Hospital while on probation	20	32	52
Absent on probation on Oct. 31st, 1916	19	30	49
	74	136	210

TABLE No. 9—TORONTO.

Showing the causes of death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died during year.			Since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Specific Infectious Diseases:—						
Typhoid Fever				1	2	3
Influenza		1	1	2	4	6
Cerebro-spinal Meningitis						
Diphtheria					1	1
Erysipelas				2	4	6
Septicæmia	1		1	4	11	15
Dysentery.....				6	4	10
Syphilis				2	1	3
Tuberculosis	6	1	7	53	84	137
Toxemia.....				1	1	2
Carbuncle.....				1		1
Constitutional Diseases:—						
Rheumatism						
Arthritis Deformans.....				1	2	3
Diabetes Mellitus					1	1
Diseases of the Digestive System:—						
Mouth, salivary glands						
Pharynx						
Tonsils.....						
Æsophagus				1		1
Gastric Ulcer					1	1
Diseases of the Intestines:—						
Diseases of the Liver.....	1	2	3	9	11	20
“ Pancreas.....				3	2	5
“ Peritoneum.....				4	7	11
Diseases of the Respiratory System:—						
Diseases of the Nose and Larynx						
“ Bronchi				3	5	8
“ Lungs				32	37	69
“ Pleura.....	1	3	4	9	7	16
Diseases of the Circulatory System:—						
Diseases of the Pericardium				1	2	3
“ Heart	5	8	13	58	55	113
Arterio-sclerosis.....	1	1	2	22	8	30
Aneurism				1		1
Diseases of the Blood and Ductless Glands:						
Anæmia		1	1	1	2	3
Pernicious Anæmia				3		3
Leucæmia						
Exophthalmic Goitre.....					1	1
Diseases of the Genito-Urinary System...	1	1	2	17	13	30
Carried forward	16	18	34	237	266	503

TABLE No. 9—TORONTO—Continued.

Showing the causes of death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died during year.			Since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
<i>Brought forward</i>	16	18	34	237	266	503
Diseases of the Nervous System :—						
Diseases of the Nerves.....				2	1	3
“ Spinal Cord				2	1	3
“ Meninges				1		1
Organic Diseases of the Brain, (Tumor, Abscess, Embolism, Throm- bosis, Hæmorrhage and other gross lesions)				21	15	36
Functional Nervous Diseases, (Paralysis Agitans, Chorea, Eclamp- sia, Hysteria).....				1		1
Epilepsy	3	3	6	28	28	56
Mental Disease :—						
Exhaustion of Acute Mental Disease..	3	4	7	24	43	67
“ Chronic				8	6	14
General Paresis	29	6	35	208	27	235
Intoxications :—						
Alcoholism				2		2
Morphinism						
Metalic Poisoning				2		2
Heat Stroke.....						
Debility of Old Age.....	19	16	35	92	91	183
Accident				1	3	4
Suicide				9	5	14
Surgical Diseases						
Gynæcological Diseases.....						
Malignant New Growths, or Cancer.....	1	2	3	7	12	19
Pellagra					3	3
Totals	71	49	120	645	501	1,146
Unclassified.....				1,159	958	2,117
				1,804	1,459	3,263

TABLE No. 10—TORONTO.

Showing form of mental disease of patients admitted, discharged and died during the year.

Mental Disease.	Admitted.			Discharged.			Died.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Infection Psychoses :—									
(a) Fever Delirium.....									
(b) Infection Delirium									
(c) Post Infection Psychoses	1		1						
Pellagra		1	1		1	1			
Exhaustion Psychoses :—									
(a) Collapsed Delirium	1	8	9		1	1	2	3	5
(b) Acute Confusional Psychoses.....									
(c) Neurasthenia.....	3		3	1		1			
Intoxication Psychoses :—									
(a) Acute Intoxications.....				3	3	6	1		1
(b) Chronic									
(a) Alcoholism (acute and chronic).....	18	4	22	3		3			
(b) Delirium Tremens.....									
(c) Korsakow's Psychoses	3	1	4						
(d) Acute Alcoholic Hallucinosiis.....									
(e) Alcoholic Hallucinatory Dementia.....									
(f) " Paranoia.....									
(g) " Paresis									
(h) Morphinism									
(i) Cocainism									
Thyroigenous Psychoses :—									
(a) Mixœdematous Psychoses.....									
(b) Cretinism									
Dementia Præcox :—									
(a) Hebaphrenic	22	23	45	8	8	16	3	1	4
(b) Catatonic.....	37	36	73	10	15	25	4	6	10
(c) Paranoid.....	6	11	17	6	7	13	2	1	3
General Paresis :.....	37	6	43		1	1	29	8	37
Organic Dementias :—									
(a) Cerebral Sclerosis.....							1		1
(b) Huntingdon's Chorea.....									
(c) Multiple Sclerosis.....									
(d) Cerebral Syphilis.....									
(e) Tabetic Psychoses									
(f) Arterio Sclerotic Psychoses.....	4	1	5						
(g) Cerebral Tumor, Abscess, Hæmorrhage.....									
Involution Psychoses :—									
(a) Melancholia	15	28	43	7	8	15		3	3
(b) Pre-senile Delusional Psychoses.....									
(c) Senile Dementia.....	18	21	39	8	4	12	24	20	44
Manic Depressive Psychoses :—									
(a) Manic States.....	20	19	39	16	25	41	1	1	2
(b) Depressed States	6	17	23	8	24	32		1	1
(c) Mixed States									
Paranoia.....									
Carried forward	191	176	367	70	97	167	67	44	111

TABLE No. 10—TORONTO—Continued.

Showing form of mental disease of patients admitted, discharged and died during the year.

Mental Diseases.	Admitted.			Discharged.			Died.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
<i>Brought forward</i>	191	176	367	70	97	167	67	44	111
Psychoses from Constitutional Neuroses:—									
(a) Epileptic Psychoses	7	3	10	4	1	5	4	4	8
(b) Hysterical Psychoses									
(c) Sexualis Psychopathia									
States of Deficient Mental Development:—									
(a) Imbecility	1	12	13		3	3			
(b) Idiocy									
Not Diagnosed								1	1
Not Insane.....	1		1	1		1			
Total.....	200	191	391	75	101	*176	71	49	120

* 6 Deports included.

TABLE No. 11—TORONTO.

Periods.		Alleged duration of insanity prior to admission.	Length of residence of those remaining in Hospital on Oct. 31st, 1916.	Periods of treatment of those who were discharged and recovered during the year.	Periods of treatment of those who were discharged and improved during the year.	Periods of treatment of those who were discharged and unimproved during the year.	Periods of treatment of those who died during the year.
Under 1 month.....	From 1 to 2 months.....	24	12	8	9	3	30
“ 2 “ 3 “	“ 3 “ 4 “	52	28	5	5	1	10
“ 3 “ 4 “	“ 4 “ 5 “	27	27	2	2	.....	7
“ 4 “ 5 “	“ 5 “ 6 “	32	31	12	8	1	7
“ 5 “ 6 “	“ 6 “ 9 “ .....	.....	22	10	6	1	4
“ 6 “ 9 “	“ 9 “ 12 “	67	18	9	4	1	3
“ 9 “ 12 “	“ 12 “ 18 “ .....	.....	43	23	15	.....	5
“ 12 “ 18 “	“ 18 months to 2 years.....	29	34	12	6	1	9
“ 18 months to 2 years.....	“ 2 to 3 years.....	34	21	4	3	.....	7
“ 2 to 3 years.....	“ 3 “ 4 “	31	87	2	5	.....	8
“ 3 “ 4 “	“ 4 “ 5 “	16	81	1	3	.....	6
“ 4 “ 5 “	“ 5 “ 10 “	6	62	.....	5	.....	6
“ 5 “ 10 “	“ 10 “ 15 “	46	52	1	1	.....	4
“ 10 “ 15 “	“ 15 “ 20 “	12	183	1	2	.....	6
“ 15 “ 20 “	“ 20 years and upwards	10	120	.....	1	.....	1
“ 20 years and upwards		.....	86	1	1	.....	1
		5	113	.....	.....	.....	6
Totals.....		391	1,020	91	76	8	120

ANNUAL STATISTICAL REPORT OF THE OPERATIONS OF THE
HOMEWOOD SANITARIUM, GUELPH, FOR THE YEAR
ENDING OCTOBER 31st, 1916.

VOLUNTARY BRANCH.

TABLE No. 1.

Showing movements of patients in the Hospital for the official year ending October 31st, 1916.

	Male.	Female.	Total.	Male.	Female.	Total.
Capacity of Hospital (both classes)	70	70	140			
In Residence October 31st, 1915				24	21	45
Admitted during year 1916:						
By Warrant						
By Medical Certificate	82	58	140	82	58	140
Total number under treatment during year..				106	79	185
Discharges during year:						
As recovered	35	11	46			
" improved	28	23	51			
" unimproved	6	9	15			
" not insane						
Total number discharged during year...	69	43	112			
Died	1	2	3			
Deported						
Eloped	5		5			
Transferred	1		1	76	45	121
Remaining in Hospital October 31st, 1916				30	34	64
Total number admitted since opening of Hospital				1,626	643	2,269
Total number discharged since opening of Hospital	1,491	568	2,059			
Total number died since opening of Hospital	45	18	63			
Total number deported since opening of Hospital						
Total number eloped since opening of Hospital	36	3	39			
Total number transferred since opening of Hospital	24	20	44	1,596	609	2,205
Total remaining in Hospital October 31st, 1916				30	34	64
Daily average population						
Collective days' stay of all patients in residence during year						
Number of applications on file						

ANNUAL STATISTICAL REPORT OF THE OPERATIONS OF THE
HOMEWOOD SANITARIUM, GUELPH, FOR THE YEAR
ENDING OCTOBER 31st, 1916.

INSANE BRANCH.

TABLE No. 1.

Showing movements of patients in the Hospital for the official year ending October 31st, 1916.

	Male.	Female.	Total.	Male.	Female	Total.
Capacity of Hospital (both classes).....	70	70	140			
In Residence October 31st, 1916.....				17	42	59
Admitted during year 1915-6:						
By Warrant.....						
By Medical Certificate.....	46	52	98	46	52	98
Total number under treatment during year				63	94	157
Discharges during year:						
As recovered	9	14	23			
" improved	18	17	35			
" unimproved	3	2	5			
" not insane.....						
Total number discharged during year....	30	33	63			
Died.....	8	5	13			
Deported						
Eloped	3		3			
Transferred	4	8	12	45	46	91
Remaining in Hospital October 31st, 1916.....				18	48	66
Total number admitted since opening of Hospital.....				572	575	1,147
Total number discharged since opening of Hospital.....	409	416	825			
Total number died since opening of Hospital.....	77	45	122			
Total number deported since opening of Hospital.....						
Total number eloped since opening of Hospital.....	8	2	10			
Total number transferred since opening of Hospital	60	64	124	554	527	1,081
Total remaining in Hospital October 31st, 1916.....				18	48	66
Daily average population						
Collective days' stay of all patients in residence during year						
Number of applications on file						

PART II

OF THE

FORTY-NINTH ANNUAL REPORT

OF THE

Inspectors of Prisons and Public Charities of the Province
of Ontario

CONTAINING REPORT ON THE

Hospital for Feeble-Minded, Orillia

AND THE

Hospital for Epileptics, Woodstock

AND THE

ELEVENTH ANNUAL REPORT

ON THE

Feeble-Minded in Ontario

BEING FOR THE YEAR ENDING 31st OCTOBER

1916

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO



TORONTO :

Printed and Published by A. T. WILGRESS, Printer to the King's Most Excellent Majesty

1917

Printed by
WILLIAM BRIGGS
Corner Queen and John Streets
TORONTO

PARLIAMENT BUILDINGS.

TORONTO, March 10th, 1917.

To His Honour SIR JOHN STRATHEARN HENDRIE, C.V.R.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I beg to submit herewith the Forty-ninth Annual Report upon the Hospitals for Feeble-Minded and Epileptic of Ontario, being for the official year ending 31st October, 1916.

I have the honour to be,

Your Honour's most obedient servant,

WM. D. McPHERSON,

Provincial Secretary.

OFFICE OF THE
INSPECTOR OF PRISONS AND PUBLIC CHARITIES, ONTARIO,

PARLIAMENT BUILDINGS, TORONTO, March 10th, 1917.

SIR,—I have the honour to transmit herewith, to be presented to His Honour the Lieutenant-Governor, the Forty-ninth Annual Report upon the Hospitals for the Feeble-Minded and Epileptics of Ontario, being for the official year ending 31st October, 1916.

We have the honour to be, Sir,

Your obedient servant,

W. W. DUNLOP,

EDWIN R. ROGERS,

Inspectors.

THE HONOURABLE WILLIAM DAVID MCPHERSON, ESQ., K.C., M.P.P.,
Provincial Secretary of the Province of Ontario,
Toronto.

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HOSPITALS FOR FEEBLE-MINDED AND EPILEPTICS.

On the 31st October, 1916, there were in the Hospitals for Feeble-Minded and Epileptics 1,034 patients divided as follows:

Orillia.			Woodstock.		
Male.	Female.	Total.	Male.	Female.	Total.
432	396	828	101	105	206

On the 31st October, 1916, there was an over population of 96 with 440 applications on file.

Orillia: The new cottages have been completed.

Woodstock: The Recreation Hall has been completed adding greatly to the welfare of the Hospital.

An implement shed has been erected proving a great convenience.

REVENUE.

The revenue collected from paying patients for the year ending 31st October, 1916, was \$24,447.51; from farm and miscellaneous \$8,227.32, making a total revenue of \$32,674.83, an increase over the year 1915 of \$3,517.72.

W. W. DUNLOP,

EDWIN R. ROGERS,

Inspectors.

TABLE No. 1.

Showing movements of patients in the Hospital for the year ending October 31st, 1916.

	Orillia Hospital.			Woodstock Hospital.			Total.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Capacity of Hospital.....	362	378	740	104	104	208	466	482	948
In Residence, Oct.31st,1915	424	407	831	102	103	205	526	510	1,036
Admitted during year 1916:									
By Warrant.....	5	.....	5	.....	.....	.....	5	.....	5
By Medical Certificate ..	44	33	77	12	13	25	56	46	102
Total number under treat- ment during year.....	473	440	913	114	116	230	587	556	1,143
Discharges during year:									
As recovered.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
As improved	1	2	3	5	7	12	6	9	15
As unimproved.....	.....	2	2	.....	.....	.....	.....	2	2
As not insane.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total number discharged during year.....	1	4	5	5	7	12	6	11	17
Died.....	34	39	73	8	4	12	42	43	85
Deported .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eloped	1	.....	1	.....	.....	.....	1	.....	1
Transferred	5	1	6	.....	.....	.....	5	1	6
Total number admitted since opening of Hospital	1,378	1,191	2,569	269	227	496	1,647	1,418	3,065
Total number discharged since opening of Hospital	138	94	232	106	73	179	244	167	411
Total number died since opening of Hospital	749	673	1,422	58	46	104	807	719	1,526
Total number deported since opening of Hospital	2	.....	2	.....	.....	.....	2	.....	2
Total number eloped since opening of Hospital.....	11	.....	11	.....	.....	.....	11	.....	11
Total number transferred since opening of Hospital	46	28	74	4	3	7	50	31	81
Total remaining in Hos- pital, October 31st, 1916	432	396	828	101	105	206	533	501	1,034
Number of applications on file.....	221	190	411	18	11	29	239	201	440
Daily average population ..	426	398	824	102	101	203	528	499	1,027
Collective days' stay of all patients in residence dur- ing year	155,967	145,687	301,654	36,894	36,906	73,800	192,861	182,593	375,454

TABLE No. 2.

Showing social state and religion of patients admitted during the year and since opening of Hospitals.

	Admissions of Year.	In Residence.	Admissions since opening.
SOCIAL STATE.			
Single	101	988	2,942
Married.....	4	43	118
Widowed.....	2	3	3
Divorced			
Separated			
Unascertained.....			2
Totals.....	107	1,034	3,065
RELIGION.			
Baptists	5	52	141
Congregationalists	1	3	8
Church of England.....	20	201	613
Methodists	22	233	789
Presbyterians	20	212	576
Roman Catholics.....	11	150	469
Other Denominations	25	92	203
Unascertained	3	91	266
Totals	107	1,034	3,065

TABLE No. 3.

Showing Nativity of Patients admitted during the year and since opening of Hospitals.

Nativity.	Admissions of Year.			Admissions since Opening.		
	Orillia Hospital.	Woodstock Hospital.	Total.	Orillia Hospital.	Woodstock Hospital.	Total.
Total Admissions	82	25	107	2,569	496	3,065
Total born in Canada.....	71	19	90	2,124	402	2,526
Armenia.....						
Assyria						
Austria.....				5		5
Australia.....						
Belgium.....						
Bulgaria						
Central America.....						
China						
Denmark						
England.....	3	4	7	146	56	202
France				4		4
Finland						
Galicia						
Germany				19	3	22
Greece						
Holland						
Hungary.						
Ireland.....				93	12	105
Italy						
Japan						
Macedonia						
Other British Possessions.....				5		5
Norway						
Roumania						
Russia.....	3	1	4	8	2	10
Scotland.....	1		1	58	11	69
South America.....						
Spain						
Sweden.....				5		5
Turkey.....						
United States.....	1	1	2	35	10	45
West Indies.....						
Unascertained	3		3	67		70
Totals.....	82	25	107	2,569	496	3,065

TABLE No. 4.

Showing the occupation of those admitted during the year and since the opening of the Hospital.

Occupation.	Admitted this Year.			Since Opening.		
	Orillia Hospital.	Woodstock Hospital.	Total.	Orillia Hospital.	Woodstock Hospital.	Total.
Professional :— Clergy, Military and Naval Officers, Physicians, Lawyers, Architects, Artists, Authors, Civil Engineers, Surveyors, etc.....	.....	1	1	.....	4	4
Commercial :— Bankers, Merchants, Accountants, Clerks, Salesmen Stenographers. Typewriters, etc.....	.....	1	1	3	24	27
Agricultural and Pastoral : Farmers, Gardeners, Stock Men, etc. ....	.....	5	5	6	46	52
Mechanics at Outdoor Vocations :— Railway and Stationery Engineers, Blacksmiths, Carpenters, Engine Fitters, Sawyers, Painters, Police, etc.....	.....	.....	.....	2	15	17
Mechanics, etc., at Sedentary Vocations :— Shoemakers, Bookbinders, Composi- tors, Weavers, Tailors, Seam- stresses, Bakers, Factory Workers, etc .....	.....	.....	.....	.....	32	32
Domestic Service :— Waiters, Cooks, Servants, etc.....	2	2	4	19	35	54
Education and Higher Domestic Duties :— Governesses, Teachers, Students, Housekeepers, Nurses, etc.....	.....	5	5	2	72	74
Miners, Marine Engineers, Railway Em- ployees, Seamen, etc.....	1	.....	1	1	1	2
Laborers.....	2	1	3	22	69	91
No Occupation	77	10	87	2,514	191	2,705
Unascertained.....	.....	.....	.....	.....	7	7
Totals.....	82	25	107	2,569	496	3,065

TABLE No. 5.

Showing the Counties and Districts from which patients have been admitted during the year, and since opening of Hospitals.

Counties and Districts.	Admitted during year.			Admitted since opening.			Warrant cases.				Remaining in residence.				
							Admitted during year.		Admitted since opening.						
	Orillia Hospital.	Woodstock Hospital.	Total.	Orillia Hospital.	Woodstock Hospital.	Total.	Orillia Hospital.	Woodstock Hospital.	Total.	Orillia Hospital.	Woodstock Hospital.	Total.	Orillia Hospital.	Woodstock Hospital.	Total.
Algoma District...				29	4	33				4	2	6	6	3	9
Brant				39	13	52				1		1	12	3	15
Bruce	1		1	66	6	72				9		9	14	3	17
Carleton.....	7		7	89	10	99				11		11	33	4	37
Dufferin.....				18	9	27				2		2	4	3	7
Dundas.....				17	1	18				4		4	6		6
Durham		1	1	37	3	40							6	1	7
Elgin		2	2	29	9	38				4	1	5	6	5	11
Essex	2		2	54	5	59				5		5	13		13
Frontenac				89	3	92				29		29	19		19
Glengarry				17		17				4		4	6		6
Grenville.....				25	2	27				1		1	3		3
Grey	3	1	4	88	7	95				18		18	19	5	24
Haldimand				28	1	29				4	1	5	3		3
Halton.....				25	5	30				3	1	4	6	2	8
Hastings.....	3		3	65	8	73				12		12	24	3	27
Huron	1		1	62	9	71				9		9	8	5	13
Kent	3		3	55	7	62				5		5	16	5	21
Lambton.....	2		2	52	21	73				8	1	9	20	6	26
Lanark.....		1	1	17	3	20				5		5	4	2	6
Leeds	1		1	31	3	34				9		9	8	2	10
Lennox and Ad- dington.....	2		2	39	1	40				9		9	13		13
Lincoln.....	1	1	2	22	8	30				4	1	5	8	4	12
Middlesex	2	1	3	98	37	135				7	1	8	32	15	47
Muskoka District..	1		1	39	1	40				3		3	12	1	13
Nipissing District.	2		2	22	5	27				4		4	16	1	17
Norfolk.....	2		2	26	7	33				10		10	7	1	8
Northumberland ..	2		2	34	4	38				8		8	12	1	13
Ontario.....	3		3	73	9	82	1		1	7		8	21	3	24
Oxford		1	1	63	25	88				8		8	20	7	27
Parry Sound Dis- trict.....				6	1	7				1		1	9	1	10
Peel.....	1		1	34	1	35				6		6	13	2	15
Perth	1		1	43	14	67				9		9	10	4	14
Peterborough	1		1	44	6	50	1		1	11		12	14	3	17
Prescott.....	1		1	16		16				9		9	10		10
Prince Edward ...				20	3	23							7	1	8
Rainy River Dis- trict.....				1		1							1		1
Renfrew.....	1		1	45	2	47				6		6	20	1	21
Russell.....				11	2	13							6	2	8
Simcoe	4	1	5	172	18	190	1		1	22	1	23	53	8	61
Stormont.....	2	1	3	20	7	27				11		11	5	5	10
Thunder Bay Dis- trict.....				1	4	5					3	3		3	3
Victoria		2	2	38	11	49				6	1	7	7	6	13
Waterloo		1	1	50	15	65				2	2	4	15	2	17
Welland.....	1	1	2	19	4	23				1	1	2	5	3	8
Wellington	4		4	50	10	60				4		4	13	5	18
Wentworth	5	2	7	127	34	161				11		11	51	16	67
York	23	9	32	490	132	622	2		2	47	10	57	208	57	265
Unascertained				34	6	40				6		6	4	2	6
Totals.....	82	25	107	2,569	496	3,065	5		5	359	26	385	828	206	1,034

TABLE No. 6.

Periods.	Alleged duration of attack prior to admission.		Length of residence of those remaining in Hospitals on Oct. 31st, 1916.		Periods of treatment of those who were discharged recovered during the year.		Periods of treatment of those who were charged improved during the year.		Periods of treatment of those who were discharged unimproved during the year.		Periods of treatment of those who died during the year.	
	Woodstock Hospital.	Orillia Hospital.	Woodstock Hospital.	Orillia Hospital.	Woodstock Hospital.	Orillia Hospital.	Woodstock Hospital.	Orillia Hospital.	Woodstock Hospital.	Orillia Hospital.	Woodstock Hospital.	Orillia Hospital.
Under 1 month.....	.....	10	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
From 1 to 2 months ..	.....	9	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 2 “ 3 “ ..	.....	6	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 3 “ 4 “ ..	.....	10	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 4 “ 5 “ ..	.....	14	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 5 “ 6 “ ..	.....	6	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 6 “ 9 “ ..	.....	14	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 9 “ 12 “ ..	.....	5	4	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 12 “ 18 “ ..	.....	16	18	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 18 months to 2 years ..	.....	25	12	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 2 to 3 years ..	1	57	18	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 3 “ 4 “ ..	.....	50	21	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 4 “ 5 “ ..	.....	35	18	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 5 “ 10 “ ..	.....	157	84	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 10 “ 15 “ ..	.....	135	15	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 15 “ 20 “ ..	.....	96	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
“ 20 years and upwards ..	7	183	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals.....	25	828	206	.....	.....	4	.....	.....	.....	.....	.....	.....
							12	1	.....	73	12	.....

TABLE No. 7.

Showing the general movement and result of treatment of patients in the Hospital for Feeble Minded, Orillia, during each of the thirty-seven years from the 1st January, 1879, to the 31st October, 1916.

	Average daily number of patients in residence.			Number of patients admitted each year.			Number of patients discharged improved and unimproved each year.			Number of patients who died in each year.			Percentage of deaths upon number residents.			Number of patients remaining in Hospital at the end of each year.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Average five years—																		
1879 to 1883	87	84	171	18	16	34	2	1	3	6	7	13	6.25	7.69	6.95	96	91	187
Average five years—																		
1884 to 1888	122	109	231	18	18	36	2	2	4	10	7	17	8.13	6.19	7.20	123	113	236
Average five years—																		
1889 to 1893	221	183	404	42	36	78	2	2	4	12	16	28	5.55	8.33	6.87	216	192	408
Average five years—																		
1894 to 1898	322	264	586	44	38	82	4	4	8	24	23	47	7.28	8.52	7.84	330	270	600
1899	353	295	648	39	43	82	3	6	9	29	28	57	8.12	9.33	8.67	357	300	657
1900	351	300	651	45	26	71	4	5	9	41	24	65	11.48	8.08	9.94	357	297	654
1901	354	300	654	33	22	55	8	1	9	32	16	48	9.12	5.29	7.36	350	302	652
1902	349	307	656	29	28	57	9	1	10	22	16	38	6.36	5.11	5.76	346	313	659
1903	348	324	672	30	39	69	4	3	7	24	7	31	6.89	2.05	4.49	348	342	690
Average five years	351	305	656	35	32	67	6	3	9	30	18	48	8.40	5.97	7.25	352	311	663
1904	350	350	700	39	43	82	3	2	5	23	18	41	6.37	4.94	5.65	361	364	725
1905	368	368	736	46	35	81	6	2	8	29	26	55	7.79	7.03	7.41	372	370	742
1906	375	377	752	43	40	83	5	4	9	40	22	62	10.64	5.71	8.15	376	385	761
1907	380	390	770	35	31	66	7	3	10	21	19	40	5.48	4.85	5.16	383	392	775
1908	384	390	774	36	28	64	5	2	7	22	31	53	5.65	8.01	6.83	389	387	776
Average five years	369	375	744	40	35	75	5	3	8	27	23	50	7.19	6.11	6.64	376	378	754
*1909	390	386	776	29	28	57	11	3	14	15	18	33	3.84	4.66	4.26	392	394	786
1910	384	383	767	30	18	48	5	7	12	20	16	36	5.07	4.17	4.58	397	389	786
1911	410	391	801	50	18	68	2	2	4	12	13	25	2.93	3.33	3.12	417	392	809
1912	412	400	812	19	29	48	1	2	3	17	17	34	4.12	4.25	4.18	415	402	817
1913	411	404	815	37	35	72	2	2	4	34	27	61	8.27	6.68	7.48	414	409	823
Average five years	402	393	795	33	26	59	4	3	7	30	18	38	4.85	4.62	4.72	407	397	804
1914	410	405	815	34	42	76	5	3	8	30	37	67	7.27	9.05	8.14	410	410	820
1915	418	408	826	34	15	49	.....	4	4	17	14	31	4.07	3.43	3.75	424	407	831
1916	426	398	824	49	33	82	1	4	5	34	39	73	7.98	9.80	8.86	432	396	828

* Ten months ending October 31st, 1909.

TABLE No. 8.
Showing the general movement and result of treatment of patients in the Hospital for Epileptics, Woodstock, during each of the years from the 1st April, 1906, to the 31st October, 1916.

	Average daily number of patients in residence.			Number of patients admitted each year.			Number of patients re-covered in each year.			Number of patients discharged inproved and unimproved each year.			Number of patients who died in each year.			Percentage of re-coveries upon admission.			Percentage of deaths upon number residents.			Number of patients remaining in Hospital at the end of each year.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
1906 (Nine months)....	18	14	32	32	26	58	....	....	....	5	5	10	1	2	3	....	....	....	3.85	10.53	6.67	26	19	45
1907.....	32	26	58	30	22	52	1	....	1	13	3	16	2	2	4	3.33	.0	1.92	5.26	5.71	5.48	38	35	73
1908.....	45	40	85	30	13	43	....	2	2	7	2	9	2	....	2	.0	15.38	4.65	3.39	.0	1.94	59	44	103
*1909.....	64	48	112	27	15	42	....	....	....	14	7	21	2	1	3	....	....	....	3.39	2.27	2.68	70	51	121
1910.....	87	68	155	38	38	76	1	....	1	14	7	21	3	2	5	2.63	.0	1.32	3.45	2.94	3.22	90	78	168
1911.....	97	89	186	31	26	57	....	....	....	13	6	19	6	2	8	....	....	....	6.18	2.25	4.30	102	96	198
1912.....	99	95	194	27	16	43	....	....	....	15	8	23	11	11	22	....	....	....	10.78	11.46	11.11	103	93	196
1913.....	105	106	206	14	23	37	....	....	....	8	3	11	4	7	11	....	....	....	3.84	6.60	5.34	105	106	211
1914.....	105	105	210	10	17	27	....	....	....	5	8	13	9	7	16	....	....	....	8.57	6.60	7.58	101	108	209
1915.....	101	105	206	18	18	36	....	....	....	7	15	22	10	8	18	....	....	....	9.90	7.71	8.74	102	103	205
1916.....	102	101	203	12	13	25	....	....	....	5	7	12	8	4	12	....	....	....	7.84	3.96	5.91	101	105	206

*Ten months ending October 31st, 1909.

TABLE No. 9.
DEATHS IN HOSPITALS.

Hospital.	No. of deaths.	Daily average population.	Percentage of deaths to daily average population.
Orillia.....	73	824	8.86
Woodstock.....	12	203	5.91
Totals.....	85	1,027	8.27

TABLE No. 10.

The following table shows the number of beds in each of the Hospitals, number in residence, and applications on file at close of official year.

Asylums.	Number of beds.			Number in residence on 31st October, 1916.			Number of vacancies.			Over population.			Applications on file.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Orillia.....	362	378	740	432	396	828	.....	.....	.....	70	18	88	221	190	411
Woodstock.....	104	104	208	101	105	206	3	.....	3	.....	1	1	18	11	29
Totals	466	482	948	533	501	1,034	3	.....	3	70	19	89	239	201	440

TABLE No. 11.

Showing the number of officers and employees in each and all of the Hospitals, classified according to the duties performed.

Occupation.	Orillia Hospital.	Woodstock Hospital.	Total.
Medical Superintendents.....	1	1	2
Associate Physicians	1	1	2
Bursars	1	1	2
Stenographers	1	1	2
Storekeepers.....	1	.....	1
Matrons	1	1	2
Assistant Matrons.....	1	.....	1
Cooks.....	4	6	10
Laundresses	2	1	3
Housemaids and Dairymaids	10	1	11
Seamstresses	3	1	4
Bakers	1	.....	1
Tailors and Shoemakers.....	2	.....	2
Laundryman	1	.....	1
Engineer and Assistants	1	1	2
Stokers.....	9	.....	9
Bricklayers and Masons .....	.....	.....	.....
Carpenters.....	.....	1	1
Painters .....	.....	.....	.....
Farmers .....	.....	1	1
Farmers' Assistants .....	.....	6	6
Gardeners .....	.....	1	1
Chief Attendants (males)	1	1	2
Supervisors (males)	4	1	5
Attendants (males)	13	5	18
Attendants (females)	15	8	23
Teachers	3	.....	3
Totals.....	76	39	115

TABLE No. 12.

Statement of revenue from paying patients and from farm and miscellaneous sources
for the year, ending October 31st, 1916.

Hospital.	No. of paying patients.	From paying patients.	From farm and Miscellaneous.	Totals.
		\$ c.	\$ c.	\$ c.
Orillia.....	153	10,405 99	4,717 47	15,123 46
Woodstock.....	164	14,041 52	3,509 85	17,551 37
Totals.....	317	24,447 51	8,227 32	32,674 83

TABLE No. 13.

Showing the expenditure on maintenance under the different headings of the estimates
for the year, ending October 31st, 1916.

Heading of Estimates.	Orillia Hospital.	Woodstock Hospital.
	\$ c.	\$ c.
Medicines	1,440 03	634 58
Groceries.....	35,802 28	11,647 15
Heat and Light	12,735 70	7,028 48
Clothing.....	7,943 43	450 05
Laundry	2,983 84	756 50
Repairs.....	6,635 88	1,542 32
Office	801 07	292 82
Farm	5,114 82	3,481 07
Miscellaneous.....	1,053 27	296 91
Total expenses	74,510 32	26,129 88
Salaries	33,265 39	17,370 24
Grand Totals.....	107,775 71	43,500 12

NOTES ON PER CAPITA STATEMENT.

Attached hereto is a statement of the cost of maintenance per patient per day for the twelve months ending October 31st, 1916, in the ten hospitals mentioned, as compared with the year 1915, being based on actual consumption.

It follows out the order of the sub-divisions of appropriations voted by the Legislature, and is calculated to two places of decimals of a cent. The figures in black-faced type represent totals.

Invoices for all purchases, properly certified by the Bursar and the Storekeeper, as to accuracy and receipt of goods, are checked in the Department before being submitted to the Treasury for payment.

A system of Daily Requisitions for all supplies, such as provisions, is carried out and these requisitions are forwarded to the Department semi-weekly. In case of coal, the amount consumed on each shift is weighed and weekly report of consumption made by the engineer.

Under headings "Provisions" and "Clothing" is shown only consumption by patients—the value of such supplies to officers, attendants, nurses and employees being included in the account "Employees' Meals and Uniforms" under the heading "Salaries."

Quarterly inventories of stock are taken at each Institution, and are checked with the ledger accounts of the Department.

Returns are made of all products of the Farm and Garden, as received, charges being made against the cost of maintenance, and the Farm and Garden given credit for the same; for this purpose a uniform price list is in use for all Institutions, regardless of size or fertility of farm. At the end of the year the value per patient per day of such products—fruits, vegetables, feed and fodder, meat and eggs—is deducted from the gross per capita cost and appears in the statement as "Farm Recoveries."

TABLE

Comparative Statement of Average Maintenance Cost per Capita

	Brockville.		Hamilton.		Kingston.	
	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.
Days' residence of patients.....	277,297	268,165	468,437	456,368	206,429	206,082
Average number of patients	757.64	734.69	1,279.88	1,250.32	564.01	564.61
	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
MEDICINES.....	.54	.49	.30	.24	1.03	.72
Medicines and Medical comforts.....	.54	.49	.30	.24	1.03	.72
PROVISIONS.....	13.05	11.85	15.60	13.90	14.96	13.17
Breakfast Foods and Cereals.....	.24	.24	.26	.20	.29	.30
Butter	2.12	1.87	2.58	2.25	2.61	2.16
Coffee and Tea.....	.38	.43	.47	.52	.36	.43
Eggs .....	.39	.29	.83	.60	.38	.23
Flour, Bread, etc.....	2.34	1.93	2.17	2.06	1.91	1.73
Fruit and Vegetables—Fresh .....	.42	.43	.55	.70	.69	.65
“ “ Canned and Dried .....	.65	.49	.62	.44	.83	.70
Milk	1.57	1.51	1.53	1.36	1.73	1.05
Potatoes.....	.55	.39	1.15	.46	.69	.53
Salt, Spices, Pickles, etc .....	.10	.06	.06	.06	.18	.12
Sugar and Syrup.....	1.00	.95	.83	.86	1.06	.94
Unenumerated Groceries .....	.89	.99	1.17	1.02	.83	.93
Butchers' Meat	1.97	1.88	2.85	2.82	2.72	2.95
Fish and Fowl .....	.43	.39	.53	.55	.68	.45
FUEL, LIGHT AND WATER.....	7.59	8.01	4.74	6.37	7.63	7.07
Coal and Wood.....	5.37	5.67	3.29	4.77	7.57	7.02
Electricity .....	.64	.61	.47	.50	.....	.....
Gas .....	.41	.79	.26	.29	.....	.....
Oil, Candles, Matches, etc .....	.07	.08	.02	.02	.06	.05
Water.....	1.10	.86	.70	.79	.....	.....
CLOTHING	2.26	2.15	1.74	1.39	2.70	2.30
Clothing—Dry Goods	1.47	1.63	1.14	1.18	2.03	1.82
Boots, Shoes, etc .....	.79	.52	.60	.21	.67	.48
LAUNDRY AND CLEANING .....	.82	.90	.59	.45	1.06	1.16
Brushes, Brooms and Mops .....	.14	.14	.10	.08	.29	.27
Miscellaneous Expenses .....	.20	.23	.17	.15	.25	.44
Soap .....	.48	.53	.32	.22	.52	.45
GENERAL REPAIRS.....	2.14	2.23	1.55	1.91	3.31	3.16
Furniture and Furnishings.....	1.58	1.55	1.18	1.52	2.41	2.47
Plant .....	.56	.68	.37	.39	.90	.69
OFFICE EXPENSES .....	.45	.41	.34	.34	.47	.54
Miscellaneous Items.....	.18	.19	.17	.18	.23	.32
Postage .....	.16	.12	.09	.08	.12	.12
Telephone and Telegraph.....	.11	.10	.08	.08	.12	.10
SALARIES.....	16.32	17.33	12.04	13.48	18.95	20.06
Supt. and Physicians	1.76	1.94	1.39	1.49	2.59	2.50
Bursar and Assistants.....	1.43	1.22	1.24	1.12	1.95	1.88
Matron and Assistants.....	2.72	2.59	2.37	2.49	2.60	2.72
Engineer and Assistants	1.96	1.63	1.09	1.15	1.94	1.58
Artisans, not Domestic .....	.80	.85	.54	.54	1.22	1.33
Teachers.....	.....	.....	.....	.....	.....	.....
Attendants and Nurses.....	7.65	8.98	5.27	6.67	8.59	9.95
Temporary Assistance.....	.....	.12	.14	.02	.06	.10

No. 14.

per Day for the Twelve Months ending 31st October, 1916.

London.		Mimico.		Orillia.		Penetang.		Toronto.		Woodstock.	
This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.
416,844	409,118	238,598	238,854	300,303	301,859	133,113	132,767	368,109	357,932	75,726	74,987
1,138.92	1,120.86	651.91	654.39	820.50	827.01	363.70	363.74	1,005.76	980.63	206.90	205.44
Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
.32	.28	.50	.49	.48	.42	.24	.19	.37	.41	.83	.83
.32	.28	.50	.49	.48	.42	.24	.19	.37	.41	.83	.83
13.41	11.48	11.93	11.25	10.98	10.23	11.00	9.62	14.38	13.83	14.26	14.34
.24	.23	.28	.27	.22	.28	.20	.17	.19	.19	.21	.19
2.51	2.13	2.31	1.91	2.53	2.20	2.09	1.86	2.51	2.45	2.99	3.16
.69	.66	.38	.35	.32	.32	.57	.55	.49	.47	.38	.38
.29	.24	.21	.20	.30	.25	.02	.02	.57	.49	.06	.11
1.94	1.58	1.98	1.69	2.38	2.25	1.94	1.69	1.62	1.65	2.17	2.12
.44	.44	.37	.57	.41	.44	.36	.39	.31	.36	.63	.72
.41	.45	.27	.15	.49	.20	.44	.27	.81	.45	1.04	.66
1.38	1.21	1.10	1.03	1.14	1.22	1.74	1.58	1.53	1.86	2.62	2.94
.51	.36	.57	.28	.24	.29	.44	.28	1.02	.67	.93	.69
.07	.07	.06	.05	.04	.05	.02	.01	.08	.08	.06	.05
1.05	.83	.77	.94	.77	.75	.34	.26	.83	.80	.99	1.08
.82	.74	.57	.78	.77	.68	.96	.60	.78	.74	.43	.40
2.38	1.97	2.56	2.47	1.06	1.06	1.41	1.36	2.98	2.83	1.02	.99
.68	.57	.50	.56	.31	.24	.47	.58	.66	.79	.73	.85
5.79	4.88	5.89	7.37	4.00	3.62	6.51	5.57	5.87	6.37	8.06	8.13
4.99	3.91	5.35	6.80	3.21	2.85	4.79	4.03	4.04	4.93	4.92	4.97
.60	.75	.45	.47	.61	.60	.18	.39	.21	.25	.80	.80
.17	.20	.....	.....	.....	.....	.....	.....	.80	.73	.....	.....
.03	.02	.09	.10	.02	.02	.03	.02	.04	.03	.03	.03
.....	.....	.....	.....	.16	.15	1.51	1.13	.78	.43	2.31	2.33
2.25	1.89	2.08	2.03	3.02	2.07	2.40	1.81	1.70	1.25	.27	1.11
1.51	1.37	1.58	1.54	2.26	1.34	1.66	1.34	1.38	1.02	.12	.97
.74	.52	.50	.49	.76	.73	.74	.47	.32	.23	.15	.14
1.10	.91	1.10	1.24	1.04	.88	.50	.64	.88	.86	.93	.97
.18	.16	.16	.18	.19	.17	.09	.09	.12	.12	.10	.14
.25	.17	.29	.27	.15	.06	.15	.22	.24	.19	.25	.28
.67	.58	.65	.79	.70	.65	.26	.33	.52	.55	.58	.55
2.54	2.05	2.14	1.76	2.48	1.70	1.45	1.32	2.20	1.66	1.69	2.23
2.11	1.63	1.78	1.21	1.72	1.22	.16	.87	1.96	1.28	.86	1.46
.43	.42	.36	.55	.76	.48	.29	.45	.24	.38	.83	.77
.35	.32	.43	.44	.28	.28	.20	.27	.30	.33	.39	.41
.18	.18	.15	.21	.09	.12	.07	.14	.15	.19	.11	.14
.10	.07	.14	.10	.13	.10	.06	.05	.05	.03	.14	.11
.07	.07	.14	.13	.06	.06	.07	.08	.10	.11	.14	.16
13.79	15.22	15.55	16.57	10.64	10.66	15.91	15.97	13.43	14.61	18.76	19.53
1.27	1.74	2.53	2.61	1.90	1.85	2.70	2.56	1.67	1.87	5.02	5.07
1.26	1.15	1.52	1.39	.97	.91	1.88	1.88	1.54	1.47	2.54	2.53
2.59	2.58	2.33	2.35	2.59	2.62	2.95	2.95	2.31	2.35	3.85	4.18
1.41	1.59	1.90	2.02	.85	.94	1.78	1.65	.96	.98	1.15	1.19
.97	.94	.79	.90	.56	.60	1.80	1.80	.61	.63	.95	.96
.....	.....	.....	.....	.41	.32	.....	.....	.....	.....	.....	.....
6.29	7.22	6.48	7.29	3.33	3.38	4.80	5.10	6.31	7.17	5.22	5.53
.....	.....	.....	.01	.03	.04	.....	.03	.03	.14	.03	.07

TABLE

Comparative Statement of Average Maintenance Cost per Capital

	Brockville.		Hamilton.		Kingston.	
	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.
Days' residence of patients.....	277,297	268,165	468,437	456,368	206,429	206,082
Average number of patients	757.64	734.69	1,279.88	1,250.32	564.01	564.61
	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
ALLOWANCES	4.69	4.49	2.93	3.74	5.55	5.87
Employees' Meals	4.32	3.97	2.65	3.38	4.97	5.28
" Uniforms .....	.22	.28	.22	.29	.31	.35
" Other Allowances .....	.15	.24	.06	.07	.27	.24
FARM AND GARDEN	6.92	7.06	4.79	4.94	4.82	4.35
Feed and Fodder	3.58	3.75	2.60	2.29	3.09	2.25
Miscellaneous Farm Expenses	1.12	1.10	.59	.96	.47	.78
Seeds, etc. ....	.24	.31	.33	.28	.25	.26
Salaries	1.98	1.90	1.27	1.41	1.01	1.06
CONTINGENCIES .....	.78	.78	.65	.89	.92	1.02
Amusements, Religion, Education .....	.21	.15	.04	.05	.18	.21
Elopers, Cost of Recovery .....	.02	.02	.01	.01	.04	.03
Freight, Duties, etc. ....	.08	.12	.08	.08	.11	.16
Ice .....	.08	.05	.14	.34	.....	.....
Incidental Expenses .....	.30	.38	.33	.38	.49	.58
Officers' Travelling Expenses .....	.09	.06	.05	.03	.10	.04
Per Capita cost per day, less Salaries	32.57	31.98	29.03	29.02	35.89	32.43
" " " " " of Salaries	22.99	23.72	16.24	18.63	25.51	26.99
Total gross per Capita cost per day	55.56	55.70	45.27	47.65	61.40	59.42
Less total recovery per Capita per day	15.87	15.89	15.39	14.95	14.97	14.45
Net per Capita burden payable by Province	39.69	39.81	29.88	32.70	46.43	44.97

N.B.—The accompanying is a Comparative Statement of the cost of maintenance per patient per day for the twelve months ending 31st October, 1916, in nine Hospitals for the Insane, as compared with the twelve months ending 31st October, 1915, based on actual consumption and calculated to two places of decimals of a cent. The figures in black-faced type represent totals.

Under the headings "Provisions" and "Clothing" is shown the actual consumption by patients—the value of such supplies to officers, attendants, nurses and employees being included in the account "Employees' Meals and Uniforms."

Where no charge is shown for light or water, these are included in the cost of coal.

No. 14—*Concluded.*

per Day for the Twelve Months ending 31st October, 1916.—*Concluded.*

London.		Mimico.		Orillia.		Penetang.		Toronto.		Woodstock.	
This Year	Last Year.	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.	This Year.	Last Year.
416,844	409,118	238,598	238,854	300,303	301,859	133,113	132,767	368,109	357,932	75,726	74,987
1,138.92	1,120.86	651.91	654.39	820.50	827.01	363.70	363.74	1,005.76	980.63	206.90	205.44
Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
4.10	4.98	4.34	4.98	3.26	3.14	4.03	3.27	3.72	3.62	5.87	5.27
3.80	4.61	3.92	4.57	3.08	2.92	3.76	2.99	3.35	3.26	5.31	4.86
.27	.33	.28	.26	.16	.17	.11	.11	.32	.30	.24	.14
.03	.04	.14	.15	.02	.05	.16	.17	.05	.06	.32	.27
5.01	5.09	4.90	5.21	2.97	3.11	6.01	6.55	.70	.86	15.88	12.16
2.51	2.60	2.02	2.08	1.47	1.80	3.04	4.12	.18	.22	7.24	6.54
.61	.77	.96	1.10	.91	.65	.40	.35	.08	.11	3.68	1.31
.48	.30	.35	.38	.16	.19	.34	.23	.03	.01	.80	.77
1.41	1.42	1.57	1.65	.43	.47	2.23	1.85	.41	.52	4.16	3.54
.50	.47	.51	.62	.35	.39	.38	.52	.77	.87	.33	.25
.09	.08	.10	.10	.07	.08	.01	.02	.05	.04	.03	.04
.02	.01	.....	.02	.....	.....	.....	.....	.....	.01	.....	.01
.04	.07	.04	.05	.10	.12	.09	.19	.09	.15	.06	.11
.....	.....	.14	.14	.....	.03	.....	.....	.27	.23	.....	.....
.34	.29	.23	.29	.16	.15	.26	.28	.28	.40	.23	.05
.01	.02	.....	.02	.02	.01	.02	.03	.08	.04	.01	.04
29.86	25.95	27.91	28.76	25.17	22.23	26.46	24.64	26.76	25.92	38.48	36.89
19.30	21.62	21.46	23.20	14.33	14.27	22.17	21.09	17.56	18.75	28.79	28.34
49.16	47.57	49.37	51.96	39.50	36.50	48.63	45.73	44.32	44.67	67.27	65.23
15.00	16.08	14.87	16.28	7.82	8.85	6.98	8.17	14.25	15.18	34.97	32.15
34.16	31.49	34.50	35.68	31.68	27.65	41.65	37.56	30.07	29.49	32.30	33.08

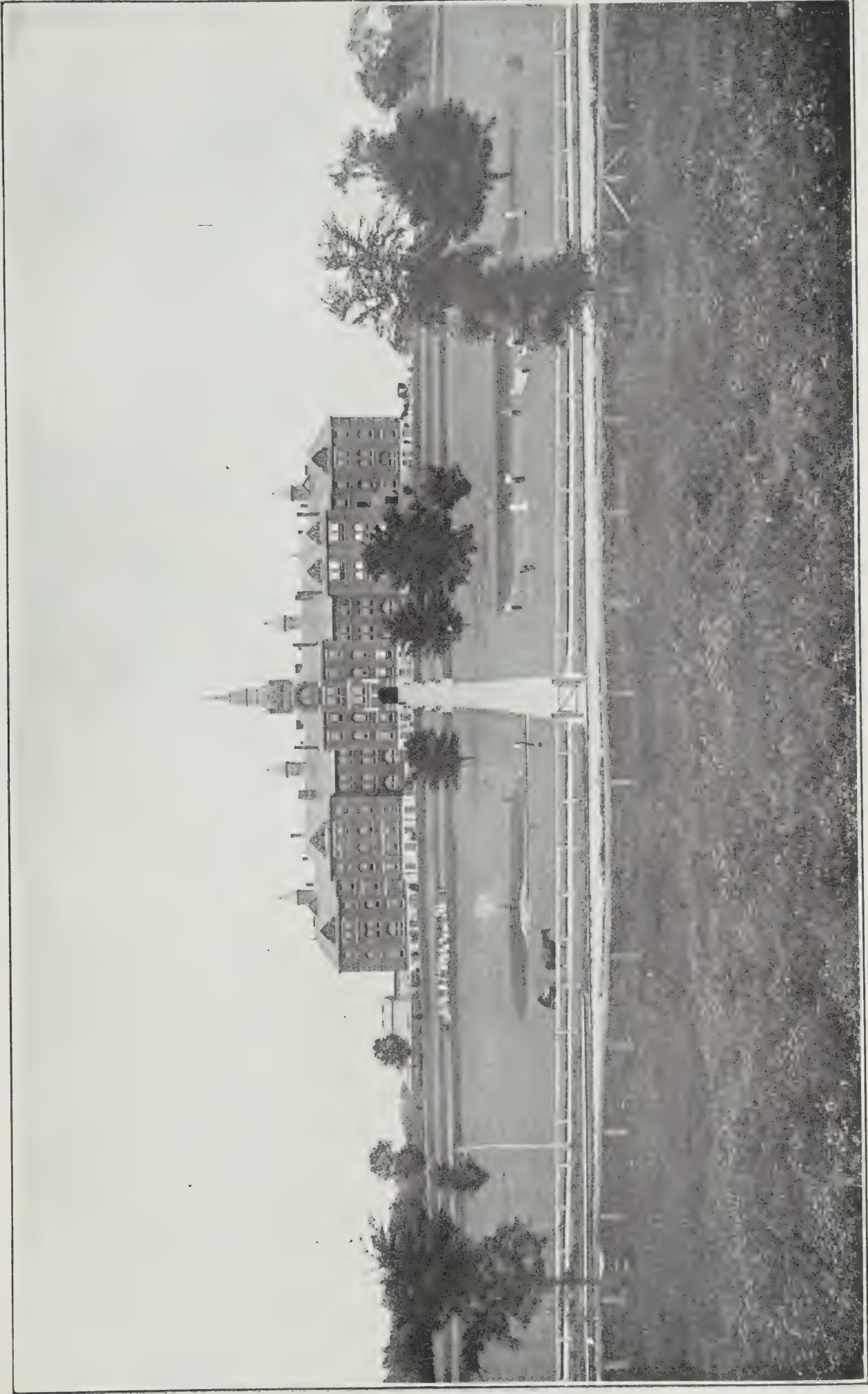
TABLE
Comparisons, Appropriation, Expenditure, Consumption, Population

	Brockville.	Hamilton.	Kingston.
Days' residence of patients,	277,297	468,437	206,429
Average number of patients.....	757.64	1,279.88	564.01
Medicines.....Appropriation.....	\$1,750	1,800	2,100
Expenditure.....	1,490	1,363 51	2,081 35
Consumption	1,490	1,405 55	2,127 85
Provisions	Appropriation.....	78,000	37,000
Expenditure.....	\$43,000	75,884 09	35,607 46
Consumption.....	36,366 08	73,079 41	30,884 57
Fuel, Light and Water..Appropriation.....	\$26,000	36,905 88	18,500
Expenditure.....	19,813 55	29,153 63	18,073 50
Consumption.....	21,034 46	22,223 95	15,750 42
Clothing, etc.....Appropriation.....	\$7,000	9,700	6,500
Expenditure.....	6,994 19	9,678 94	6,492 24
Consumption	6,266 25	8,148 18	5,582 27
Laundry, etc.....Appropriation.....	\$2,500	3,000	2,740
Expenditure	2,418 53	2,969 50	2,727 60
Consumption	2,273 36	2,781 29	2,189 10
General Repairs, etc.....Appropriation.....	\$6,500	10,000	7,500
Expenditure.....	5,713 06	9,425 49	7,493 92
Consumption	5,936 27	7,282 35	6,822 60
Office.....Appropriation.....	\$1,300	1,600	1,500
Expenditure.....	1,260 01	1,597 14	1,003 68
Consumption	1,248 01	1,605 64	966 63
Salaries	Appropriation.....	74,404	53,770
Expenditure.....	\$62,202	62,389 22	41,215 10
Consumption	50,741 05	76,094 44	52,672 32
Farm, etc.....Appropriation.....	\$9,000	9,000	7,000
Expenditure.....	8,862 62	8,996 10	5,397 72
Consumption	13,696 13	16,466 20	7,858 70
Contingencies.....Appropriation.....	\$2,600	3,850	2,670
Expenditure.....	2,048 89	3,056 76	2,239 93
Consumption	2,155 89	3,060 06	1,896 93
Total Maintenance.....Appropriation.....	\$161,852	228,259 88	139,280
Expenditure.....	135,707 98	204,514 38	122,332 50
Consumption	154,039 43	212,147 07	126,751 39
Capital Accounts	Appropriation.....	25,481 90	31,539 72
Expenditure.....	\$40,141 29	20,506 99	21,049 25
Grand Total	Appropriation.....	253,741 78	170,819 72
Expenditure.....	\$201,993 29	225,021 37	143,381 75
REVENUE COLLECTIONS.			
From paying patients this year to date.....	\$26,672 62	51,041 71	21,972 08
“ “ last “	26,522 97	44,138	19,688 79
Patients Revenue per capita this year..... cents	9.62	10.89	10.64
“ “ “ last “	9.89	9.67	9.55
From Farm and Misc. Sales this year.....	\$3,274 51	2,710 37	870 87
“ “ last “	543 68	806 79	819 61
Farm and Mis. Revenue per capita this year....cents	1.18	58	42
“ “ “ last “	20	10	40
Total Revenue this year.....	\$29,947 13	53,752 08	22,842 95
“ last “	27,066 65	44,944 79	20,508 40
Total Revenue per capita per day this year	10.80	11.47	11.06
“ “ “ last “	10.09	9.77	9.95
Farm Production Consumption this year	5.07	3.92	3.91
“ “ “ last “	5.80	5.18	4.50
Total Recovery per capita this year	15.87	15.39	14.97
“ “ “ last “	15.89	14.95	14.45

No. 14.—*Concluded.*

and Revenue for the 12 Months ending 31st October, 1916.

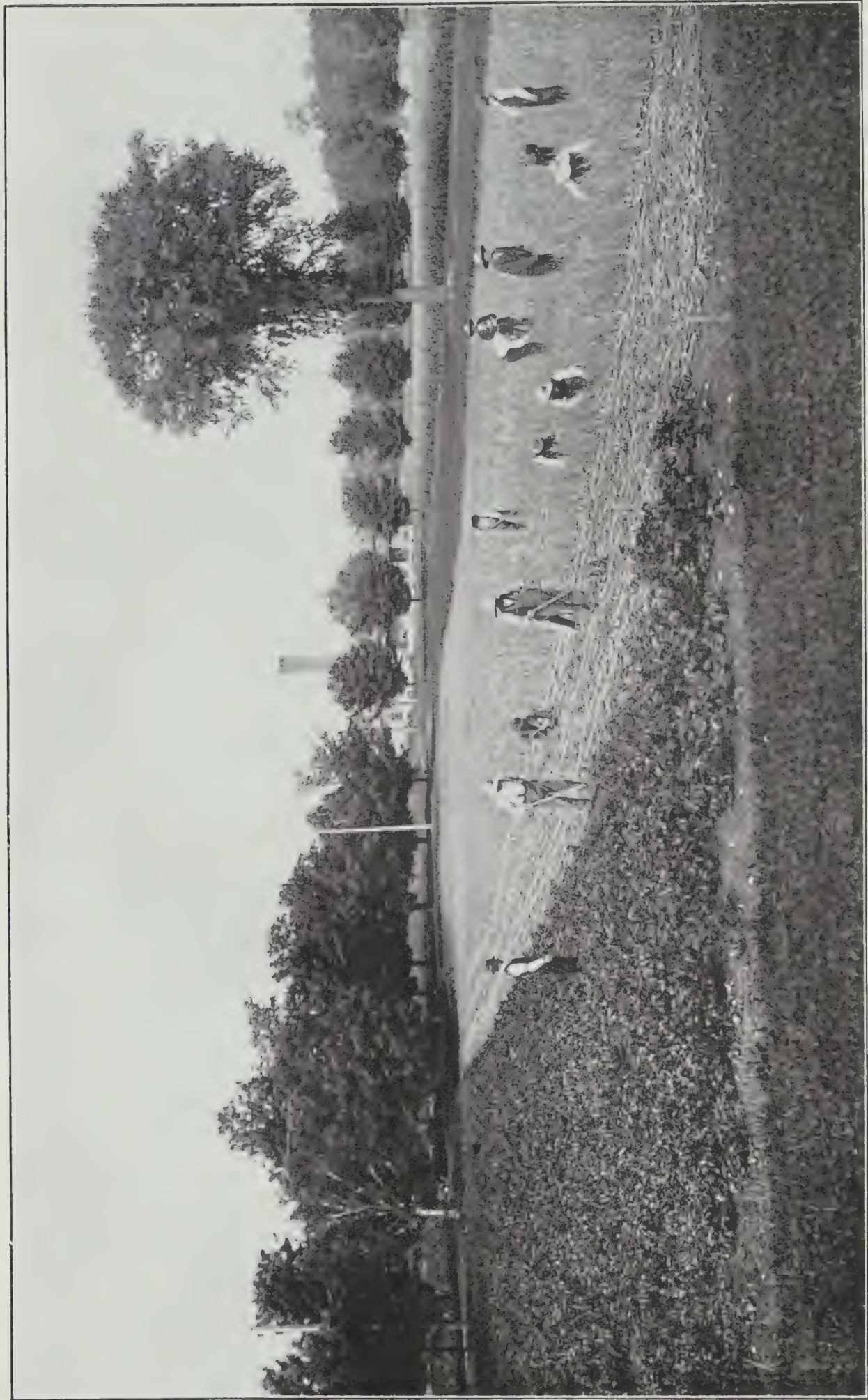
London.	Mimico.	Orillia.	Penetang.	Toronto.	Woodstock.
416,844	238,598	300,303	133,113	368,109	75,726
1,138.92	651.91	820.50	363.70	1,005.76	206.90
1,500	1,300	1,500	750	1,800	700
1,335 35	1,183 86	1,440 03	314 24	1,350 31	634 58
1,335 35	1,183 86	1,440 03	314 24	1,353 25	634 58
62,000	35,000	36,500	16,000	68,500	12,000
61,947 67	31,639 11	35,802 28	15,748 79	66,715 84	11,647 15
55,910 17	28,477 45	32,970 36	14,636 56	52,946 17	10,805 35
23,000	23,000	13,000	11,600	25,000	8,500
19,934 23	13,811 63	12,735 70	10,569 53	24,737 90	7,028 48
24,123 55	14,056 04	12,007 31	8,670 75	21,622 08	6,108 09
10,150	6,000	8,000	3,300	7,000	1,500
9,776 67	5,803 32	7,943 43	3,136 84	6,952 62	450 05
9,389 39	4,967 18	9,067 74	3,192 05	6,273 14	201 08
4,500	2,800	3,000	1,200	4,000	1,200
4,388 88	2,741 09	2,983 84	795 22	3,297 71	756 50
4,577 88	2,617 30	3,132 51	671 17	3,247 74	702 99
11,000	6,500	7,500	3,000	8,000	1,800
10,760 67	3,781 23	6,635 88	1,129 54	7,919 62	1,542 32
10,569 83	5,106 65	7,440 76	1,933 35	8,083 30	1,279 57
1,500	1,200	1,200	600	1,512 50	500
1,457 31	1,033 54	801 07	278 75	1,113 19	292 82
1,450 96	1,030 51	849 57	278 75	1,113 19	292 82
73,350	50,135	43,022	28,086	63,522	19,316
63,386 63	40,871 79	33,265 39	24,160 29	50,940 65	17,370 24
80,494 56	51,235 91	43,047 29	29,527 20	64,653 80	21,814 58
9,500	4,000	6,000	4,500	3,700	3,500
9,485 37	3,066 77	5,114 82	4,474 77	980 79	3,481 07
14,991 95	7,935 34	7,620 70	5,026 27	1,074 26	8,875 31
2,500	2,200	1,800	1,150	3,500	1,000
2,059 10	1,097 15	1,053 27	692 74	2,840 73	296 91
2,093 99	1,227 89	1,053 95	503 74	2,840 19	251 06
199,000	132,135	121,522	70,186	186,534 50	50,016
184,531 88	105,029 49	107,775 71	61,300 71	166,849 36	43,500 12
204,937 63	117,838 13	118,630 22	64,744 08	163,207 12	50,965 43
33,584 95	20,000	173,616 76	20,961	438,581 84	16,973 71
23,955 41	9,911 64	154,812 74	16,415 90	434,260 79	7,229 45
232,584 95	152,135	295,138 76	91,147	625,116 34	66,989 71
208,487 29	114,941 13	262,588 45	77,716 61	601,110 15	50,729 57
43,635 45	24,371 65	10,403 99	2,157 17	51,553 29	14,041 52
46,472 68	25,473 59	12,326 01	4,045 79	53,185 30	13,819 08
10.47	10.21	3.47	1.62	14.00	18.53
11.35	10.67	4.08	3.05	14.86	18.42
4,653 06	1,298 57	4,717 47	1,972 22	622 26	3,509 85
771 29	505 92	854 67	499 61	685 32	2,157 35
1.12	54	1.57	1.48	17	4.63
19	21	28	38	19	2.88
48,288 51	25,670 22	15,123 46	4,129 39	52,175 55	17,551 37
47,243 97	25,979 51	13,180 68	4,545 40	53,870 62	15,976 43
11.59	10.75	5.04	3.10	14.17	23.16
11.54	10.88	4.36	3.43	15.05	21.30
3.41	4.12	2.78	3.88	08	11.81
4.54	5.40	4.49	4.74	13	10.85
15.00	14.87	7.82	6.98	14.25	34.97
16.08	16.28	8.85	8.17	15.80	32.15



Main Building, Orillia.



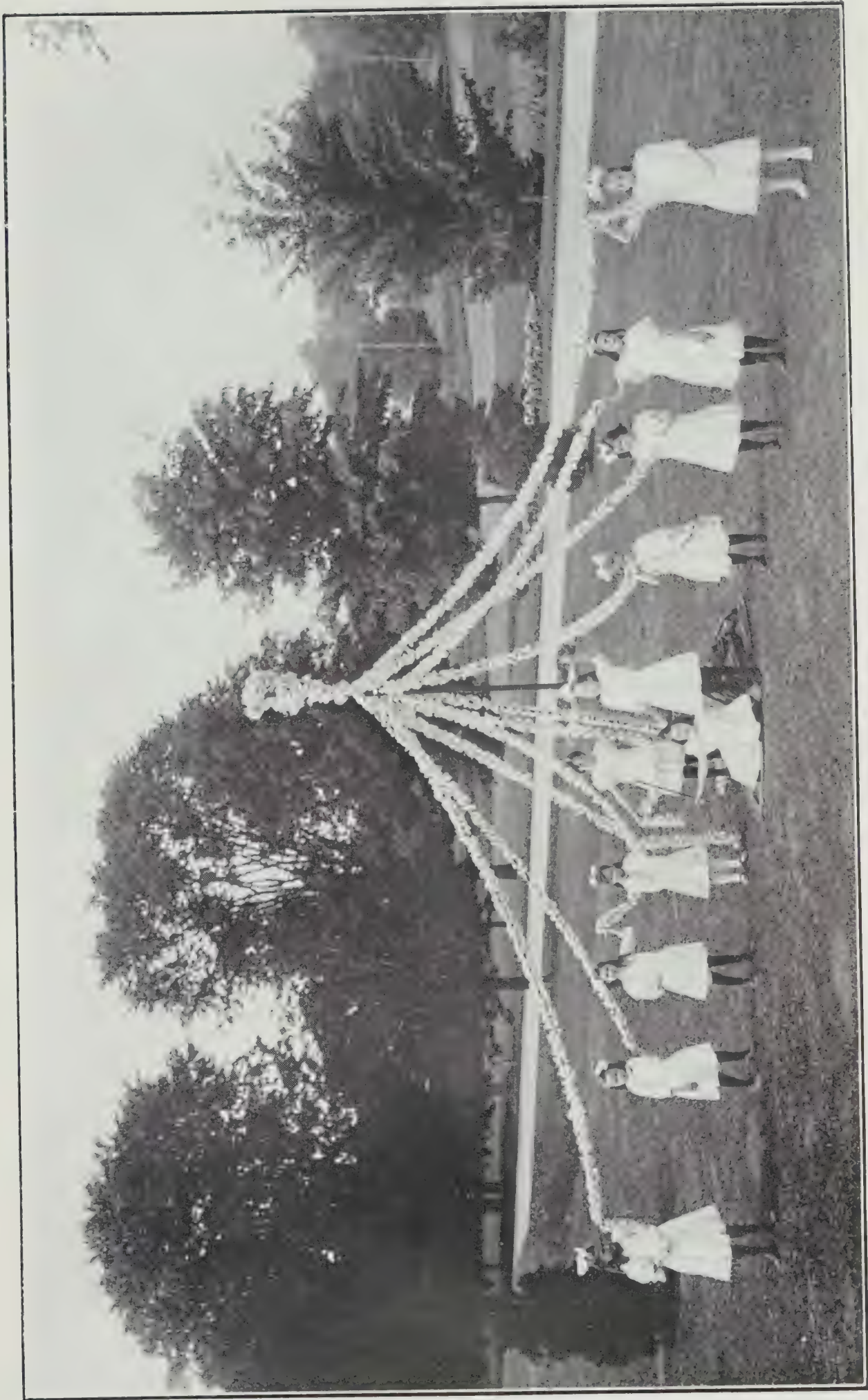
General View of Main Building and Grounds Overlooking Lake, Orillia.



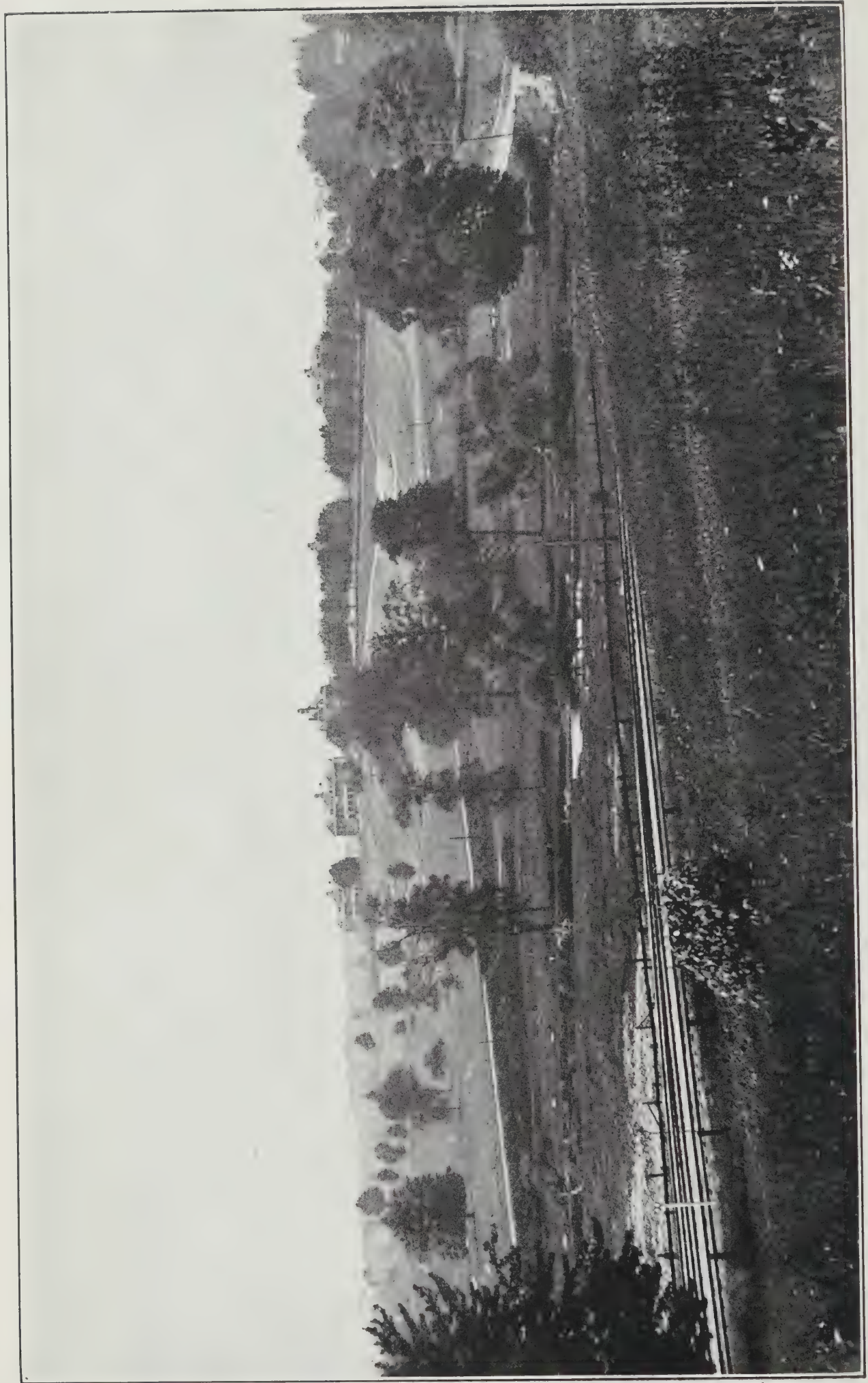
Farm, Orillia Hospital.



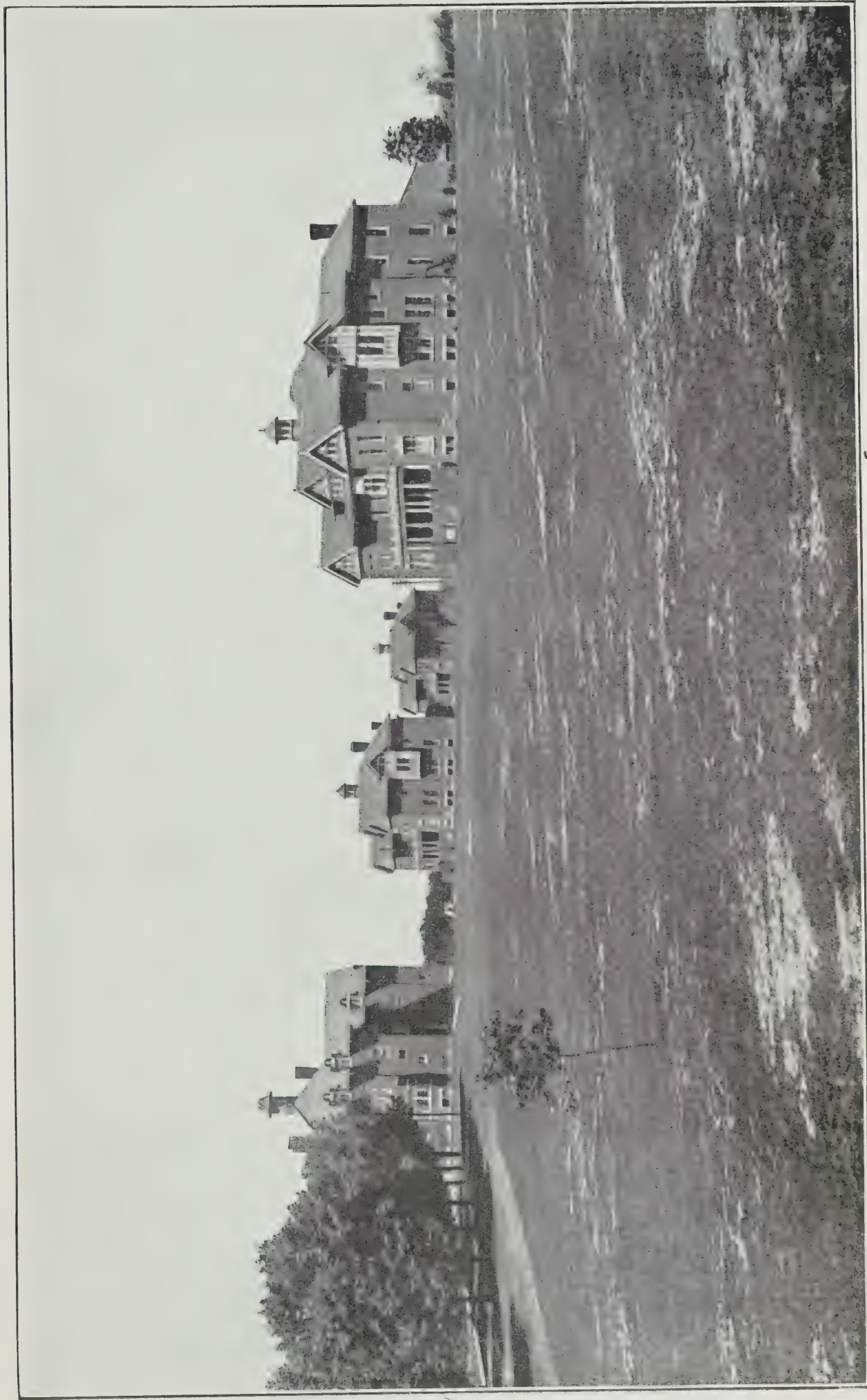
Industrial Class, Orillia Hospital.



May-Day, Orillia Hospital.



Bird's-eye View of Buildings and Grounds, Woodstock.



Cottages, Woodstock.



The Pond, Woodstock.

APPENDIX

TO FORTY-NINTH ANNUAL REPORT UPON THE HOSPITALS FOR
THE INSANE, CONTAINING THE ANNUAL REPORTS OF THE
MEDICAL SUPERINTENDENTS OF THE HOSPITAL FOR FEEBLE-
MINDED, ORILLIA, AND THE HOSPITAL FOR EPILEPTICS,
WOODSTOCK.

HOSPITAL FOR FEEBLE-MINDED, ORILLIA.

E. R. ROGERS, Esq.; W. W. DUNLOP, Esq.,

Inspectors of Asylums, Parliament Buildings, Toronto, Ont.

SIRS,—I have the honour to present the Annual Report of the Hospital for Feeble-Minded, Orillia, for the year ending October 31st, 1916.

The principal figures of our report are as follows: Admissions, 49 males, 33 females, total 82; deaths 34 males, 39 females, a total of 73. Discharges during the same period were 3. The average daily population for the year 1916 was 824.

The excessive death rate is due largely to a very wide-spread epidemic of measles from which, or its sequelæ there were twenty-seven deaths. A considerable proportion of these were from marasmatic conditions, which followed after the attack. Twenty-four were of the low grade class and generally of puny health; two were imbeciles, and one a moron afflicted with cardiac disease. All the brighter and more physically stable children who contracted the malady passed through it much as normal children would, though we noticed more than usual nervous instability, sometimes amounting to delirium.

Nothing worthy of comment has transpired during the past year. The drain that the war imposed upon our man power has been sensibly felt, but we managed to keep things going. During the year that has closed we have not had in our employ any unmarried man of military age who was physically fit for the army. This policy has made it difficult at times to maintain the service at the usual standard and has imposed extra labour upon some of our employees. It was felt, however, that it was only just to the men who enlisted, to see to it that their places were not filled by others who should be at the front.

In previous reports we have tried to point out the importance of industrial training as a factor in the life of this institution and the happiness and usefulness of its inmates. The time seems opportune to emphasize this basic truth. We are nearing the completion of our building programme. There yet remain to be constructed, a kitchen, bakery, store, etc., adjacent to the main block, and a laundry contiguous to the new engine room. Since a separate building is to be erected for a laundry the suggestion naturally arises, why not make it a complete industrial centre, incorporating in one block all the activities of the institution? The carpenter shop, with its lumber storage, and the paint shop, stocked with inflammable material, are now located in the basements of our main building and boys' cottage. They materially increase our fire risk and certainly should be in a separate structure. A new industrial block could supply accommodation for these industries, and at the same time take care of the sewing room, tailor shop, shoe shop, etc.

Our new cottages are nearly finished. The south cottage for females will be ready for occupation in a couple of months, and the boys' building should be completed before spring. Unfortunately for us and for the many cases on our waiting list, it is proposed to house the insane population from Whitby in the girls' cottage, in order that the institution at Whitby may be given over to returned sick and

wounded soldiers. It is most gratifying to be able to report that the announcement of the Department's decision to use our new cottage to make room for the stricken soldiers from France, has been received by friends of prospective patients in almost every instance without protest, and in many cases with words of appreciation. It is another instance of sacrifices cheerfully made for the Empire and the Empire's defenders.

I have the honour to be, Gentlemen,

Your obedient servant,

J. P. DOWNEY,

Superintendent.

TABLE No. 1—ORILLIA.

Showing movements of patients in the Hospital for the official year ending Oct. 31st, 1916.

	Male.	Female.	Total.	Male.	Female.	Total.
Capacity of Hospital.....	362	378	740			
In residence Oct. 31st, 1915				424	407	831
Admitted during year 1916:						
By Warrant	5		5			
By Medical Certificate.....	44	33	77	49	33	82
Total number under treatment during year				473	440	913
Discharges during year:						
As recovered						
As improved.....	1	2	3			
As unimproved		2	2			
As not insane						
Total number discharged during year....	1	4	5			
Died	34	39	73			
Deported						
Eloped	1		1			
Transferred	5	1	6	41	44	85
Remaining in Hospital Oct. 31st, 1916....				432	396	828
Total number admitted since opening of Hospital				1,378	1,191	2,569
Total number discharged since opening of Hospital.....	138	94	232			
Total number died since opening of Hospital.....	749	673	1,422			
Total number deported since opening of Hospital	2		2			
Total number eloped since opening of Hospital.....	11		11			
Total number transferred since opening of Hospital	46	28	74	946	795	1,741
Total remaining in Hospital Oct. 31st, 1916				432	396	828
Daily average population.....	426	398	824			
Collective days' stay of all patients in residence during year	155,967	145,687	301,654			
Number of applications on fyle.....			411			

TABLE No. 2.—ORILLIA.

Showing social state and religion of patients admitted during the year and since opening of Hospital.

	Admissions of year.			In residence Oct. 31, 1916.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
SOCIAL STATE.									
Single	49	33	82	430	392	822	1,365	1,178	2,543
Married				2	3	5	11	12	23
Widowed					1	1	.....	1	1
Divorced,									
Separated									
Unascertained								2	2
Total	49	33	82	432	396	828	1,378	1,191	2,569
RELIGION.									
Baptists.....	1	1	2	18	15	33	59	41	100
Congregationalists	1	.....	1	1	1	2	4	3	7
Church of England.....	8	4	12	73	74	147	249	239	488
Methodists	10	7	17	94	90	184	342	305	647
Presbyterians.....	13	3	16	86	78	164	247	226	473
Roman Catholics.....	6	4	10	81	51	132	256	172	428
Other Denominations....	10	12	22	33	47	80	89	82	171
Unascertained .....	.....	2	2	46	40	86	132	123	255
Total	49	33	82	432	396	828	1,378	1,191	2,569

TABLE No. 3—ORILLIA.

Showing nativity of patients admitted during the year and since opening of Hospital.

Nativity.	Admissions of Year.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Total Admissions.....	49	33	82	1,378	1,191	2,569
Total born in Canada.....	42	29	71	1,135	989	2,124
Armenia.....						
Assyria.....						
Austria.....				4	1	5
Australia.....						
Belgium.....						
Bulgaria.....						
Central America.....						
China.....						
Denmark.....						
England.....	3		3	77	69	146
France.....				3	1	4
Finland.....						
Galicia.....						
Germany.....				12	7	19
Greece.....						
Holland.....						
Hungary.....						
Ireland.....				50	43	93
Italy.....						
Japan.....						
Macedonia.....						
Other British Possessions.....				3	2	5
Norway.....						
Roumania.....						
Russia.....	2	1	3	3	5	8
Scotland.....	1		1	33	25	58
South America.....						
Spain.....						
Sweden.....				3	2	5
Turkey.....						
United States.....	1		1	20	15	35
West Indies.....						
Unascertained.....		3	3	35	32	67
Total.....	49	33	82	1,378	1,191	2,569

TABLE No. 4—ORILLIA.

Showing the Occupation of those admitted during the year and since the opening of the Hospital.

Occupation.	Admitted this Year.			Since Opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Professional:— Clergy, Military and Naval Officers, Physicians, Lawyers, Architects, Artists, Authors, Civil Engineers, Surveyors, etc.						
Commercial:— Bankers, Merchants, Accountants, Clerks, Salesmen, Stenographers, Typewriters, etc.				3		3
Agricultural and Pastoral:— Farmers, Gardeners, Stock Men, etc.				6		6
Mechanics at Outdoor Vocations:— Railway and Stationary Engineers, Blacksmiths, Carpenters, Engine Fitters, Sawyers, Painters, Police, etc.				2		2
Mechanics, etc., at Sedentary Voca- tions:— Shoemakers, Bookbinders, Com- positors, Weavers, Tailors, Seamstresses, Bakers, Factory Workers, etc.....						
Domestic Service: Waiters, Cooks, Servants, etc.....		2	2		19	19
Education and Higher Domestic Duties:— Governesses, Teachers, Students, Housekeepers, Nurses, etc.....				1	1	2
Miners, Marine Engineers, Railway Employees, Seamen, etc.....	1		1	1		1
Laborers	2		2	22		22
No Occupation	46	31	77	1,343	1,171	2,514
Unascertained						
Totals	49	33	82	1,378	1,191	2,569

TABLE No. 5—ORILLIA.

Showing the Counties and Districts from which patients have been admitted during the year, and since opening of Hospital.

Counties and Districts.	Admitted during year.			Admitted since opening.			Warrant cases.						Remaining in residence.		
							Admitted during year.			Admitted since opening.					
	Male.	Female.	Total	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Algoma District.....				14	15	29				2	2	4	2	4	6
Brant				23	16	39				1		1	10	2	12
Bruce		1	1	35	31	66				5	4	9	7	7	14
Carleton	5	2	7	49	40	89				6	5	11	14	19	33
Dufferin				7	11	18					2	2	2	2	4
Dundas				12	5	17				3	1	4	3	3	6
Durham				17	20	37							5	1	6
Elgin				11	18	29					4	4	3	3	6
Essex	1	1	2	31	23	54				2	3	5	5	8	13
Frontenac				50	39	89				16	13	29	13	6	19
Glengarry				12	5	17				4		4	5	1	6
Grenville				14	11	25					1	1	1	2	3
Grey	3		3	57	37	88				13	5	18	12	7	19
Haldimand				20	8	28				4		4	2	1	3
Halton				14	11	25				1	2	3	2	4	6
Hastings	2	1	3	32	33	65				7	5	12	15	9	24
Huron	1		1	36	26	62				6	3	9	6	2	8
Kent	1	2	3	27	28	55				2	3	5	9	7	16
Lambton	1	1	2	30	22	52				4	4	8	12	8	20
Lanark				10	7	17				4	1	5	2	2	4
Leeds		1	1	17	14	31				6	3	9	4	4	8
Lennox and Ad- dington		2	2	19	20	39				2	7	9	6	7	13
Lincoln		1	1	11	11	22				2	2	4	4	4	8
Middlesex	1	1	2	65	33	98				6	1	7	24	8	32
Muskoka District....		1	1	19	20	39				2	1	3	6	6	12
Nipissing District...	2		2	11	11	22				4		4	8	8	16
Norfolk	1	1	2	11	15	26				5	5	10	1	6	7
Northumberland..	1	1	2	15	19	34				5	3	8	7	5	12
Ontario	2	1	3	43	30	73	1		1	6	1	7	12	9	21
Oxford				32	31	63				7	1	8	11	9	20
Parry Sound Dis- trict				4	2	6				1		1	3	6	9
Peel		1	1	11	23	34				3	3	6	3	10	13
Perth		1	1	19	24	43				7	2	9	2	8	10
Peterborough ...	1		1	20	24	44	1		1	6	5	11	8	6	14
Prescott	1		1	12	4	16				7	2	9	9	1	10
Prince Edward..				8	12	20							4	3	7
Rainy River Dis- trict					1	1								1	1
Renfrew	1		1	21	24	45				1	5	6	10	10	20
Russell				4	7	11								6	6
Simcoe	3	1	4	91	81	172	1		1	15	7	22	23	30	53
Stormont	2		2	13	7	20				11		11	2	3	5
Thunder Bay Dis- trict				1		1									
Victoria				22	16	38				5	1	6	2	5	7
Waterloo				25	25	50				2		2	7	8	15
Welland		1	1	9	10	19					1	1	3	2	5
Wellington	1	3	4	27	23	50				2	2	4	4	9	13
Wentworth	3	2	5	65	62	127				3	8	11	22	29	51
York	16	7	23	271	219	490	2		2	33	14	47	116	92	208
Unascertained ...				16	14	30				2	2	4		1	1
Temiskaming				1		1				1		1	1		1
Haliburton.....					3	3					1	1		2	2
Total.....	49	33	82	1,378	1,191	2,569	5		5	224	135	359	432	396	828

TABLE No. 6.—ORILLIA

Showing hereditary tendency to Insanity in patients admitted during the year and since the opening of the Hospital.

	Admitted during Year.		
	Male.	Female.	Total.
Paternal Branch	1	5	6
Maternal Branch.....	6	6	12
Paternal and Maternal Branches	3	3	6
Collateral Branches	6	1	7
No Hereditary Tendency.....	11	6	17
Unascertained	22	12	34
Totals.....	49	33	82

TABLE No. 7.—ORILLIA.

Showing summary of Probational discharges during the year.

	Male.	Female.	Total.
Number Granted Discharge	5	1	6
Discharged, Recovered.....			
“ Improved.....			
“ Unimproved			
Died.....			
Returned to Hospital.....	1		1
Absent on Probation on October 31st, 1916	4	1	5
	5	1	6

TABLE No. 8—ORILLIA

Showing the causes of death of patients who died during the year and since the opening of the hospital.

Cause of Death.	Died during year.			Since Opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Specific Infectious Diseases :—						
Typhoid-Fever				17	16	33
Influenza				2	7	9
Cerebro-spinal Meningitis				3	10	13
Diphtheria				2	2	4
Erysipelas				3	2	5
Septicaemia				6	5	11
Dysentery		1	1	13	15	28
Syphilis				3		3
Tuberculosis	5	5	10	177	171	348
Other Infections	8	9	17	8	9	17
Constitutional Diseases :—						
Rheumatism				1		1
Arthritis Deformans				1		1
Diabetes Mellitus				2		2
Diseases of the Digestive System :—						
Mouth, salivary glands						
Pharynx					1	1
Tonsils				1	2	3
Œsophagus						
Diseases of the Intestines :—						
Diseases of the Liver				9	5	14
“ “ Pancreas				2	1	3
“ “ Peritoneum				33	22	55
Diseases of the Respiratory System :—						
Diseases of the Nose and Larynx				3	2	5
“ “ Bronchi	1		1	12	8	20
“ “ Lungs	10	11	21	52	62	114
“ “ Pleura				8	2	10
Diseases of the Circulatory System :—						
Diseases of the Pericardium				2	1	3
“ “ Heart	2	1	3	59	53	112
Arterio-sclerosis				1	2	3
Aneurism						
Diseases of the Blood and Ductless Glands :—						
Anæmia				8	9	17
Pernicious Anæmia				4	7	11
Leukæmia					2	2
Exophthalmic Goitre						
Diseases of the Genito-Urinary System ..	1		1	17	6	23
Totals—Carried Forward	27	27	54	449	422	871

TABLE No. 8—ORILLIA—Continued.

Showing the causes of death of patients who died during the year and since the opening of the hospital.

Cause of Death.	Died during year.			Since Opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Totals—Brought Forward	27	27	54	449	422	871
Diseases of the Nervous System:—						
Diseases of the Nerves.....				10	6	16
“ “ Spinal Cord.....				3	6	9
“ “ Meninges.....				2	9	11
Organic Diseases of the Brain. (Tumor, Abscess, Embolism, Thrombosis, Hæmorrhage, and other gross lesions).....		1	1	14	16	30
Functional Nervous Diseases, (Paralysis Agitans, Chorea, Eclampsia, Hysteria).....				1	3	4
Epilepsy.....	6	7	13	105	90	195
Mental Diseases:—						
Exhaustion of Acute Mental Disease.....					1	1
“ “ Chronic “ “.....				1		1
General Paresis.....				53	37	90
Intoxications:—						
Alcoholism.....						
Morphinism.....						
Metallic Poisoning.....					1	1
Heat Stroke.....						
Debility of Old Age.....	1	3	4	90	65	155
Accident.....				5	4	9
Suicide.....						
Surgical Diseases.....				15	9	24
Gynæcological Diseases.....						
Malignant New Growths, or Cancer.....		1	1	2	3	5
Totals	34	39	73	750	672	1,422

TABLE No. 9—ORILLIA—Continued.

Showing form of mental disease of patients admitted, discharged and died during the year.

Mental Disease.	Admitted.			Discharged.			Died.		
	Male.	Female	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Brought Forward .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Paranoia .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Psychoses from Constitutional Neuroses:—									
(a) Epileptic Psychoses.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(b) Hysterical Psychoses.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(c) Sexualis Psychopathia .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
States of Deficient Mental Development:—									
(a) Imbecility.....	23	22	45	1	4	5	6	12	18
(b) Idiocy.....	26	11	37	.....	.....	.....	28	27	55
Not Diagnosed .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Not Insane.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals.....	49	33	82	1	4	5	34	39	73

TABLE No. 10—ORILLIA.

Periods.	Alleged duration of insanity prior to admission.	Length of residence of those remaining in Hospital on Oct. 31st, 1916.	Periods of treatment of those who were discharged recovered during the year.	Periods of treatment of those who were discharged improved during the year.	Periods of treatment of those who were discharged unimproved during the year.	Periods of treatment of those who died during the year.
Under 1 month	10	.....	.....	1	.....
From 1 to 2 months.....	9	.....	.....	.....	1
“ 2 “ 3 “	6	.....	.....	.....	1
“ 3 “ 4 “	10	.....	.....	.....	1
“ 4 “ 5 “	14	.....	.....	.....	.....
“ 5 “ 6 “	6	.....	.....	.....	4
“ 6 “ 9 “	14	.....	.....	.....	1
“ 9 “ 12 “	5	.....	.....	.....	2
“ 12 “ 18 “	16	.....	.....	.....	3
“ 18 months to 2 years.....	25	.....	1	.....	2
“ 2 to 3 years.....	57	.....	.....	.....	3
“ 3 “ 4 “	50	.....	.....	.....	2
“ 4 “ 5 “	35	.....	.....	.....	.....
“ 5 “ 10 “	157	.....	1	.....	13
“ 10 “ 15 “	135	.....	.....	.....	16
“ 15 “ 20 “	96	.....	1	.....	10
“ 20 years and upwards.....	183	.....	1	.....	13
Totals	828	.....	4	1	73

HOSPITAL FOR EPILEPTICS, WOODSTOCK, ONT.

ANNUAL REPORT OF THE MEDICAL SUPERINTENDENT FOR THE YEAR ENDING
OCTOBER 31ST, 1916.

TO EDWIN R. ROGERS, ESQ., AND W. W. DUNLOP, ESQ.,

Inspectors of Hospital for the Insane and Epileptics,

Parliament Buildings, Toronto, Canada.

SIR,—I have the honour to submit to you the Eleventh Annual Report for the Hospital for Epileptics, for the year ending October 31st, 1916.

We had remaining in residence November 1st, 1915, 205 patients. We admitted during the year 12 males and 13 females, total 25 patients. Total number under treatment during the year 230. Total number discharged 12. Discharged improved 12. Unimproved none. Total number who died during the year 12, being 8 males and 4 females. We had remaining in residence October 31st, 1916, 206 patients.

IMPROVEMENTS.

Amusement Hall has been completed, it is a beautiful building; plenty of room and well lighted. It adds a great deal to the general welfare of the Hospital. We are now able to conduct our Sunday services with comfort for all. The amusements through the week are much appreciated, as all who are physically fit can now attend.

Implement Shed.—We have just completed a large shed to store the implements. This will be a great convenience as well as a protection from the exposure to the weather, as previous to this we could store but a few implements in the barns.

Some painting both inside and out has been done during past year. Grounds fitted up and driveways improved.

FARM AND GARDEN.

The past year was very unfavourable with the wet spring and the extreme hot dry weather of the summer. Crops suffered terribly. Our root crop was a failure. The potato crop was a complete loss, scarcely getting the seed back. Small vegetables were also more or less affected. Hay, wheat, and barley turned out very well, we having harvested the following from stated acreage:

40 acres	Hay	110 tons
11 “	Wheat	350 bus.
9 “	Barley.....	400 “
18 “	Corn	100 tons
37 “	Oats.....	1150 bus.
20 “	Alfalfa.....	50 tons

We grew one acre of flax for the Dominion Government. This turned out well.

DAIRY HERD.

During the past year we changed our Dairy Herd from Grade Holsteins to Dual Purpose Durham. Our herd of Holsteins was one of the best in the Province, both as regards production of milk and butter fat. This herd was divided up

and sent to some of the other institutions. We are now endeavoring to build up a satisfactory herd of Dual Purpose Durhams. Of course this takes time and a great deal of culling out has to be done before we get the class that is suitable and satisfactory for the procuring of a profitable herd, but we look for good results in the near future.

TILING.

We have on hand at the present 38,000 tile to be used in draining the last farm purchased. The work of laying them will be completed in the early spring of 1917. This will put our farm in good shape. This year it was impossible to seed more than the half of it owing to the wet and muddy state of the land.

MEAT SUPPLY.

During the past year we have been getting our supply of meat from the abattoir at Guelph. The meat has been choice and the service excellent, our requirements having been promptly filled and entire satisfaction given.

IMPROVEMENT OF PATIENTS.

During the past year quite a percentage of our patients have shown marked improvement both physically and mentally, many of them having gone through the year without a seizure and completely free of mental disturbances.

CONCLUSION.

I want to thank you, Sirs, for the deep interest you have taken in everything that pertains to the advancement of the affairs of the Hospital.

I have the honour to remain,

Your obedient servant,

J. J. WILLIAMS,

Medical Superintendent.

ANNUAL STATISTICAL REPORT OF THE OPERATIONS OF THE
HOSPITAL FOR EPILEPTICS, WOODSTOCK, FOR THE
YEAR ENDING OCT. 31st, 1916.

TABLE No 1—WOODSTOCK.

Showing movements of patients in the Hospital for the official year ending Oct. 31st, 1916.

	Male.	Female.	Total.	Male.	Female.	Total.
Capacity of Hospital	104	104	208			
In Residence Oct. 31st, 1915				102	103	205
Admitted during year 1916 —						
By Warrant	12	13	25	12	13	25
By Medical Certificate						
Total number under treatment during year				114	116	230
Discharges during year:—						
As recovered	5	7	12			
As improved						
As unimproved						
As not insane						
Total number discharged during year ..	5	7	12			
Died	8	4	12			
Deported						
Eloped						
Transferred				13	11	24
Remaining in Hospital, Oct. 31st, 1916..				101	105	206
Total number admitted since opening of Hospital				269	227	496
Total number discharged since opening of Hospital	106	73	179			
Total number died since opening of Hospital	58	46	104			
Total number deported since opening of Hospital						
Total number eloped since opening of Hospital						
Total number transferred since opening of Hospital	4	3	7	168	122	290
Total remaining in Hospital, Oct. 31st, 1916				101	105	206
Daily average population	101.8	101.11	202.19			
Collective days' stay of all patients in residence during year	36,894	36,906	73,800			
Number of applications on file	18	11	29			

TABLE No. 2—WOODSTOCK.

Showing social state and religion of patients admitted during the year and since opening of Hospital.

	Admissions of Year.			In Residence.			Admissions since opening.		
	Male	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
SOCIAL STATE.									
Single	10	9	19	87	79	166	221	178	399
Married		4	4	12	26	38	46	49	95
Widowed	2	.....	2	2	.....	2	2	.....	2
Divorced									
Separated									
Unascertained									
Totals	12	13	25	101	105	206	269	227	496
RELIGION.									
Baptists	2	1	3	6	13	19	20	21	41
Congregationalists				1	.....	1	1	.....	1
Church of England.....	2	6	8	22	32	54	64	61	125
Methodists	2	3	5	25	24	49	71	71	142
Presbyterians	3	1	4	27	21	48	60	43	103
Roman Catholics.....	1	.....	1	10	8	18	25	16	41
Other Denominations.....	2	1	3	8	4	12	23	9	32
Unascertained .....	.....	1	1	2	3	5	5	6	11
Totals	12	13	25	101	105	206	269	227	496

TABLE No. 3—WOODSTOCK.

Showing nativity of patients admitted during the year and since opening of Hospital.

Nativity.	Admissions of Year.			Admissions since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Total Admissions.....	12	13	25	269	227	496
Total born in Canada.....	11	8	19	221	181	402
Armenia						
Assyria						
Austria						
Australia.....						
Belgium.....						
Bulgaria						
Central America.....						
China						
Denmark						
England.....	1	3	4	25	31	56
France						
Finland						
Galicia				3		3
Germany						
Greece						
Holland						
Hungary				6	6	12
Ireland.....						
Italy						
Japan						
Macedonia.....						
Other British Possessions.....						
Norway						
Roumania		1	1		2	2
Russia				6	5	11
Scotland						
South America						
Spain						
Sweden						
Turkey.....						
United States		1	1	8	2	10
West Indies						
Unascertained						
Totals	12	13	25	269	227	496

TABLE No. 4—WOODSTOCK.

Showing the occupation of those admitted during the year and since the opening of the Hospital.

Occupation.	Admitted this year.			Since opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Professional:— Clergy, Military and Naval Officers, Physicians, Lawyers, Architects, Artists, Authors, Civil Engineers, Surveyors, etc.....	1	.....	1	4	.....	4
Commercial:— Bankers, Merchants, Accountants, Clerks, Salesmen. Stenographers, Typewriters, etc.....	.....	1	1	21	3	24
Agricultural and Pastoral:— Farmers, Gardeners, Stock Men, etc..	5	.....	5	46	.....	46
Mechanics at Outdoor Vocations:— Railway and Stationary Engineers, Blacksmiths, Carpenters, Engine Fitters, Sawyers, Painters, Police, etc. ....	.....	.....	.....	15	.....	15
Mechanics, etc., at Sedentary Vocations:— Shoemakers, Bookbinders, Composi- tors, Weavers, Tailors, Seam- stresses, Bakers, Factory Workers, etc .....	.....	.....	.....	17	15	32
Domestic Service:— Waiters, Cooks, Servants, etc.....	1	1	2	3	32	35
Education and Higher Domestic Duties:— Governesses, Teachers, Students, Housekeepers, Nurses, etc.	1	4	5	10	62	72
Miners, Marine Engineers, Railway Em- ployees, Seamen, etc. ....	.....	.....	.....	1	.....	1
Laborers	1	.....	1	69	.....	69
No occupation.....	3	7	10	76	115	191
Unascertained .....	.....	.....	.....	7	.....	7
Totals.....	12	13	25	269	227	496

TABLE No. 5—WOODSTOCK.

Showing the Counties and Districts from which patients have been admitted during the year, and since opening of Hospital.

Counties and Districts.	Admitted during year.			Admitted since opening.			Warrant cases.						Remaining in residence.		
							Admitted during year.			Admitted since opening.					
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Algoma District...				2	2	4				1	1	2	1	2	3
Brant				7	6	13							2	1	3
Bruce				3	3	6							2	1	3
Carleton.....				3	7	10							1	3	4
Dufferin.....				4	5	9							2	1	3
Dundas.....				1		1									
Durham.....	1		1	3		3							1		1
Elgin	2		2	5	4	9				1		1	3	2	5
Essex				3	2	5									
Frontenac				3		3									
Glengarry															
Grenville.....				1	1	2									
Grey	1		1	3	4	7							2	3	5
Haldimand				1		1				1		1			
Halton				4	1	5				1		1	1	1	2
Hastings				5	3	8							2	1	3
Huron.....				7	2	9							4	1	5
Kent				4	3	7							2	3	5
Lambton				12	9	21				1		1	3	3	6
Lanark.....	1		1	2	1	3							2		2
Leeds					3	3								2	2
Lennox and Ad- dington.....					1	1									
Lincoln.....		1	1	6	2	8					1	1	2	2	4
Middlesex	1		1	23	14	37				1		1	8	7	15
Muskoka District..					1	1								1	1
Nipissing District.				1	4	5								1	1
Norfolk.....				4	3	7								1	1
Northumberland ..				2	2	4								1	1
Ontario.....				1	8	9							1	2	3
Oxford.....	1		1	13	12	25							4	3	7
Parry Sound Dis- trict					1	1								1	1
Peel.....					1	1								2	2
Perth				12	2	14							3	1	4
Peterborough				3	3	6							1	2	3
Prescott.....															
Prince Edward ...				2	1	3							1		1
Rainy River Dis- trict															
Renfrew.....				1	1	2								1	1
Russell.....				1	1	2							1	1	2
Simcoe	1		1	10	8	18				1		1	3	5	8
Stormont.....	1		1	5	2	7							4	1	5
Thunder Bay Dis- trict				4		4				3		3	3		3
Victoria		2	2	4	7	11				1		1	1	5	6
Waterloo.....	1		1	12	3	15				2		2	2		2
Welland.....		1	1	3	1	4				1		1	2	1	3
Wellington				4	6	10							2	3	5
Wentworth	1	1	2	15	19	34							6	10	16
York.....	1	8	9	65	67	132				5	5	10	28	29	57
Unascertained				4	2	6							1	1	2
Totals.....	12	13	25	269	227	496				19	7	26	101	105	206

TABLE No. 6—WOODSTOCK.

Showing the assigned causes of Epilepsy in the cases admitted during year.

Causes.	Men.	Women	Total.	Inherited Predisposition.			Un-ascertained.
				Men.	Women.	Total.	
Moral:—							
Adverse Conditions (such as loss of friends, business troubles, etc.)	1	.....	1	.....	.....	.....	.....
Mental Strain, Worry and Overwork (not included in above)...	2	.....	2	.....	.....	.....	.....
Religious Excitement .....	.....	.....	.....	.....	.....	.....	.....
Love Affairs, including seduction.	.....	.....	.....	.....	.....	.....	.....
Fright and Nervous Shock .....	.....	.....	.....	.....	.....	.....	.....
Physical:—							
Alcoholism .....	.....	.....	.....	.....	.....	.....	.....
Sexual Excess .....	.....	.....	.....	.....	.....	.....	.....
Venereal Diseases .....	.....	.....	.....	.....	.....	.....	.....
Masturbation .....	.....	.....	.....	.....	.....	.....	.....
Insolation .....	.....	.....	.....	.....	.....	.....	.....
Accident or Injury	2	1	3	.....	.....	.....	.....
Pregnancy .....	.....	.....	.....	.....	.....	.....	.....
Parturition and Puerperium .....	.....	.....	.....	.....	.....	.....	.....
Lactation .....	.....	.....	.....	.....	.....	.....	.....
Climacteric Period .....	.....	.....	.....	.....	.....	.....	.....
Fevers .....	.....	.....	.....	.....	.....	.....	.....
Privation and Overwork .....	.....	.....	.....	.....	.....	.....	.....
Epilepsy .....	.....	.....	.....	.....	.....	.....	.....
Other Convulsive Diseases	1	.....	1	.....	.....	.....	.....
Diseases of Brain and Skull .....	.....	.....	.....	.....	.....	.....	.....
Senility .....	.....	.....	.....	.....	.....	.....	.....
Exophthalmic Goitre .....	.....	.....	.....	.....	.....	.....	.....
Epidemic Influenza .....	.....	.....	.....	.....	.....	.....	.....
Abuse of Drugs .....	.....	.....	.....	.....	.....	.....	.....
Lose of Special Sense .....	.....	.....	.....	.....	.....	.....	.....
Uræmia .....	.....	.....	.....	.....	.....	.....	.....
Other Auto-infection .....	.....	1	1	.....	.....	.....	.....
Other Bodily Diseases .....	.....	.....	.....	.....	.....	.....	.....
Hereditary:—							
Congenital Defect	1	1	2	.....	.....	.....	.....
Unascertained	5	10	15	.....	.....	.....	.....
Not Insane .....	.....	.....	.....	.....	.....	.....	.....
Totals.....	12	13	25	.....	.....	.....	.....

TABLE No. 7—WOODSTOCK.

Showing hereditary tendency to insanity in patients admitted during the year and since the opening of the Hospital.

	Admitted during Year.			Since Opening.		
	Male	Female.	Total.	Male.	Female.	Total.
Paternal Branch.....				14	13	27
Maternal Branch		2	2	21	14	35
Paternal and Maternal Branches				1	4	5
Collateral Branches.....				17	14	31
No Hereditary Tendency.....				179	151	330
Unascertained	12	11	23	37	31	68
Total.....	12	13	25	269	227	496

TABLE No. 8—WOODSTOCK.

Showing summary of Probational Discharges during the year.

	Male.	Female.	Total.
Number granted probational Discharge	3	8	11
Discharged, Recovered while on probation			
Discharged, Improved “ “	1	2	3
Discharged, Unimproved “ “	1		1
Died			
Returned to Hospital	1	5	6
Absent on Probation on October 31st, 1916		1	1

TABLE No. 9—WOODSTOCK.

Showing the causes of death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died during year.			Since Opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
Specific Infectious Diseases:—						
Typhoid Fever.....						
Influenza.....						
Cerebro-spinal Meningitis.....						
Diphtheria.....						
Erysipelas.....					1	1
Septicæmia.....						
Dysentery.....						
Syphilis.....						
Tuberculosis.....		1	1	2	1	3
Constitutional Diseases:—						
Rheumatism.....						
Arthritis Deformans.....						
Diabetes Mellitus.....						
Diseases of the Digestive System:—						
Mouth, salivary glands.....						
Pharynx.....						
Tonsils.....					1	1
Œsophagus.....						
Diseases of the Intestines:—						
Diseases of the Liver.....						
Diseases of the Pancreas.....					1	1
Diseases of the Peritoneum.....						
Diseases of the Respiratory System:—						
Diseases of the Nose and Larynx.....					1	3
Diseases of the Bronchi.....	1	1	2	2	6	12
Diseases of the Lungs.....	1		1	6	6	
Diseases of the Pleura.....						
Diseases of the Circulatory System:—						
Diseases of the Pericardium.....				4	3	7
Diseases of the Heart.....						
Arterio-sclerosis.....						
Aneurism.....						
Diseases of the Blood and Ductless Glands:—						
Anæmia.....				2	2	4
Pernicious Anæmia.....						
Leucæmia.....						
Exophthalmic Goitre.....						
Diseases of the Genito-Urinary System.....						
Carried Forward.....	2	2	4	16	16	32

TABLE No. 9—WOODSTOCK.—Continued.

Showing the causes of death of patients who died during the year and since the opening of the Hospital.

Cause of Death.	Died during year.			Since Opening.		
	Male.	Female.	Total.	Male.	Female.	Total.
<i>Brought Forward</i>	2	2	4	16	16	32
Diseases of the Nervous System:—						
Diseases of the Nerves.....						
Diseases of the Spinal Cord.....						
Diseases of the Meninges.....						
Organic Diseases of the Brain (Tumor, Abscess, Embolism, Thrombosis, Hemorrhage and other gross lesions).....	2		2	7	1	8
Functional Nervous Diseases (Par- alysis Agitans, Chorea, Eclampsia, Hysteria).....				2		2
Epilepsy.....	4	2	6	30	25	55
Mental Diseases:—						
Exhaustion of Acute Mental Dis- ease.....				1		1
Exhaustion of Chronic Mental Dis- ease.....				2	3	5
General Paresis.....						
Intoxications:—						
Alcoholism.....						
Morphinism.....						
Metallic Poisoning.....						
Heat Stroke.....						
Debility of Old Age.....						
Accident.....						
Suicide.....						
Surgical Diseases.....						
Gynæcological Diseases.....						
Malignant New Growths, or Cancer.....					1	1
Totals.....	8	4	12	58	46	104

TABLE No. 10—WOODSTOCK.

Periods.	Alleged duration of epilepsy prior to admission.	Length of resi- dence of those remaining in Hospital on Oct. 31st, 1916.	Periods of treat- ment of those who were dis- charged recover- ed during the year.	Periods of treat- ment of those who were dis- charged improved during the year.	Periods of treat- ment of those who were dis- charged unim- proved during the year.	Periods of treat- ment of those who died during the year.
Under 1 month.....		5				
From 1 to 2 months.....		2				
“ 2 “ 3 “.....		1		1		1
“ 3 “ 4 “.....		2				
“ 4 “ 5 “.....		2				
“ 5 “ 6 “.....		2		1		
“ 6 “ 9 “.....		2				2
“ 9 “ 12 “.....		4		2		
“ 12 “ 18 “.....		18		3		1
“ 18 months to 2 years... 1	1	12		1		2
“ 2 to 3 years.....		18		1		1
“ 3 “ 4 “.....	2	21		1		2
“ 4 “ 5 “.....	1	18		2		
“ 5 “ 10 “.....	4	84				3
“ 10 “ 15 “.....	5	15				
“ 15 “ 20 “.....	5					
“ 20 years and upwards	7					
Totals.....	25	206		12		12

(C⁴)

Office of the Inspector of the Feeble-Minded, Ontario,
Parliament Buildings, Toronto.

February 23rd, 1917.

SIR,—I have the honour to transmit herewith, to be presented to His Honour the Lieutenant-Governor, the Eleventh Annual Report on the Feeble-Minded in Ontario for the year ending October 31st, 1916.

I have the honour to be,

Sir,

Your obedient servant,

HELEN MACMURCHY,
Inspector.

HON. WILLIAM DAVID MCPHERSON, K.C., M.P.P.,
Provincial Secretary of Ontario.

Feeble-Minded in Ontario Eleventh Annual Report (1916)

for the Year 1916

In his official Report for the year 1875, Mr. J. W. Langmuir, Inspector of Asylums and Prisons, said in connection with his recommendation that "A Training School for Young Idiots" should be founded and maintained as one of the Public Institutions of the Province. "None of the institutions that have come into existence since Confederation was more urgently required than the one now proposed."

Preparations were then being made for the establishment of the Institution for Mental Defective at Orillia, and the first inmates were admitted on September 25th, 1876, being transferred from the Hospital for the Insane at London. It was the case then and it is the case still, in almost every Hospital for the Insane in the world, that in addition to patients who are suffering from mental disease, there are always inmates who are simply mentally defective, and should for economic reasons and every other reason be placed in a separate institution specially adapted to them. It would appear that these first inmates at the Orillia Institution were adults (that is, in so far as their chronological age is concerned) for we find the following passage in the official report dated September 30th, 1876:—

"There still remains to be carried into effect the recommendation for the establishment of a Training School for Idiots. It has been found improper as well as difficult, to combine an Asylum for adult idiots and a training school for juvenile idiots under one roof, the example of, and association with, untrained adult idiots being detrimental to the education of those who are still capable of receiving instruction. It is respectfully recommended therefore, that a separate building should be erected, if the area of land will admit, upon the same grounds and under the same general management as the Orillia Asylum, where children of tender years can be received and taught such habits as to render possible for them life in the domestic relation.* Such an institution would be an inestimable boon to many afflicted families and would diminish the number of those who would otherwise require to be provided for by the Province."

In addition to the forty-two patients thus transferred from the London Hospital for the Insane in September, 1876, there were fifteen transferred from gaols and two were admitted from private houses, making a total of fifty-nine. Dr. Wallace was the first Superintendent and remained in charge until January, 1877, when he was transferred to the staff of Hamilton Hospital for the Insane.

Dr. A. H. Beaton was then appointed Superintendent and remained in charge until August 1st, 1910, when he resigned. He did a great deal for the Institution, organizing classes, developing industries, training the younger inmates, and introducing modern methods. He frequently pointed out the necessity of careful classification, better care for feeble-minded women, the industrial training of every worker, and the provision of additional buildings and larger grounds.

*This is possible only in an Institution, generally speaking.

In 1879, Dr. W. W. Ireland, Medical Superintendent of Institutions at Larbert, Scotland, and an eminent authority on mental defect, visited the Orillia Institution. In the report of his visit, written after returning to Scotland, the following passage occurs:—

“In Upper Canada, which I visited last autumn, I found that the separation of Idiots and Lunatics had been already made, all of the Idiots having been taken from the Asylums at Toronto, London and Kingston and sent to Orillia. Through the kindness and hospitality of the Superintendent, Dr. A. H. Beaton, I had an opportunity of thoroughly seeing this Asylum. The patients were lodged in a building which had once been an hotel, looking upon a wide and beautiful lake. Dr. Beaton was making the best of his accommodations until a new Asylum should be erected on the grounds close by. The inmates, about 150 in number, consisted of Idiots, both old and young, with a few demented. Many of them were recent arrivals. They looked healthy and contented. The food seemed to be excellent and the patients well cared for. There was a Governess who was giving lessons to the children, but I understand it was contemplated in the course of time to erect a Training School elsewhere and to make Orillia the Asylum for adult Idiots. In Hamilton Asylum two wards have been set apart for Idiots, 27 of whom have been received.”

In 1879, the total number of inmates at Orillia was 169, and there were so many applications for admission that two wards in the Hamilton Hospital for the Insane were set aside for the accommodation of idiots. These wards were filled almost immediately, and it was found necessary to provide more accommodation, which was done in 1882 by leasing the building known as the Queen's Hotel for three years and fitting it up for about 90 male patients. The Hamilton inmates were then transferred to Orillia and new admissions made until once more all room was exhausted. Temporary relief was again obtained by transferring thirty of the Orillia inmates to the Hospital for the Insane at Kingston in 1885. In the same year the present site (originally the Martin Farm) was bought and the erection of the present buildings begun. In October, 1887, the building for male patients with 100 beds was opened, and the old hotel was vacated. In February following (1888) the girls' building with the same number of beds was occupied.

In 1888 a teacher was appointed and the first training class organized. The present main building was begun in 1889 and fully occupied on April 15th, 1891, when there was a total population of 420, with a waiting list of 60, and for the first time and perhaps the only time in its history there were 130 available beds in the Institution for a short time.

In 1892 the total number of inmates was 525, including 192 children of school age. By 1898 the total population had increased to about 600, and in the same year a Chapel and Recreation Hall was built which has been of great importance and assistance to the work of the Institution.

In 1904-5 the establishment of the Woodstock Hospital for Epileptics relieved somewhat the pressure on the Institution, but still the population had risen to 725.

On August 1st, 1910, Dr. Beaton retired and the present Superintendent, Mr. J. P. Downey, was appointed.

Events of great importance in the history of the Institution took place in 1911. The purchase of some three or four acres of land adjacent to the waterfront secured an addition which had long been desired, and the possession of

which has been a boon to the Institution. Two large farms were acquired, one of 112 acres, the Scott Farm, and the other of 164 acres, part of the Dunn property. The total area of the grounds and farm lands is now 456 acres. A new and excellent waterworks system, new dairy barns and other improvements followed, and in these and other undertakings, great use was made of the labour of the inmates. In this year the total population was 810, and the following important classification is reported by the Superintendent on an industrial or occupational basis:—

Number of inmates actively employed	339
Number of inmates occasionally employed	136
Number of inmates unemployable	278
Number of children in the school	57
	<hr/>
	810

Although from 1910 to 1915 no additional accommodation was available, the pressure for admission was so great, and the desire was so great on the part of the Superintendent and Staff to do all that could be done to help the mentally-defective of the Province and their families who are so much to be sympathized with in their affliction, that room for “One more” was made many times, so that the number of inmates has still increased as shown by the following figures:—

1912	817
1913	823
1914	820
1915	828

In the meantime the new lands enabled the management to make many improvements in farm and garden work. The improvement in the Dairy Herd, in the other stock and in the horses, has been marked, and is a cause for congratulation. In connection with the administration, the establishment of a laboratory in connection with the medical work, under the charge of Dr. Herriman and his assistants, has been of the greatest benefit. When an epidemic of diphtheria was threatened the laboratory work and findings enabled the medical staff to use the resources of modern medical science in protecting the inmates and officers and in maintaining their good health.

In the year 1913 another important event took place. The building of two new cottages was begun, to house about 300 patients, 150 in each cottage. These are practically completed, but, as is generally known, in order to make room for our returned soldiers at the new Whitby Hospital, it has been necessary as a temporary arrangement to transfer the patients already in residence at Whitby to one of the cottages at Orillia. It is hoped that before long the new cottages will be available for the many applicants now on the waiting list.

The site of the Orillia Hospital for the Feeble-minded on Lake Couchiching is a beautiful one. The farm lands are extensive and fertile for the most part. The grounds have been carefully laid out and are very attractive, and attention is paid to the recreation of the inmates both in winter and summer. It is to be wished that the people of the Province knew more of this Institution and its work, as well as of the beauty of the site and the excellence of the Institution Farm, which produces a very large part of the food required by the Institution.

Inmates should be sent to such an Institution at an early age so that they can receive the best possible training, suitable to their powers, and to their position in the Institution, where, if they are only received at the right age

and properly trained, it should be possible to give almost every inmate good and useful occupation, profitable both to that individual inmate and to the whole Institution. It must not be forgotten that mentally-defective persons differ among themselves much as normal persons do, and that each mental defective, as a rule, is good for something and is capable of being made happy. It is a cheering sign that Superintendent Downey is able to report a marked increase in the number of applications for admission on behalf of inmates belonging to the higher grades of mental defect.

A GOOD EXAMPLE.

In these days when each of us desires above all things to do his part and her part to help in the Great Cause, the Superintendent, Officers and Staff of the Orillia Institution have reason to be proud of the example they have set. They have helped much in Red Cross work and in 1915 subscribed the generous sum of \$2,225.00. When the equipment of the Ontario Military Hospital at Orpington was called for and needed at once, they, with the aid of the inmates, did their share, and made 508 pyjama suits in five days. Thirteen men of the staff have enlisted and six other soldiers, all sons of members of the staff, have enlisted at the call of the King and Country and joined the army on whose victory depends not only the fate of the British Empire, but the cause of freedom, of civilization and of Christianity.

THE PROVINCIAL ASSOCIATION FOR THE CARE OF THE FEEBLE-MINDED.

This Association held its Annual Meeting in the City Hall, Toronto, on the morning of March 28th, 1916, when a number of delegates attended and the following officers were elected:—

Officers.

<i>President</i>	COL. J. E. FAREWELL, Whitby.
<i>First Vice-President</i>	MRS. A. M. HUESTIS, Toronto.
<i>Second Vice-President</i>	DR. R. CARNEY, Windsor.
<i>Third Vice-President</i>	MISS PATTON, Ottawa.
<i>Fourth Vice-President</i>	MR. JAMES MCNEILLIE, Lindsay.
<i>Secretary-Treasurer</i>	DR. C. M. HINCKS, Toronto.

It was resolved to carry on the work of the Association during the year by forming new Branches or Auxiliary Associations throughout the Province, and by conducting an Educational Campaign. In accordance with this the Secretary, in the name of the Officers and Executive Committee, prepared a letter, which was sent to the Mayors of many of the cities and towns of Ontario, asking them to co-operate in the work of the Association.

ASSOCIATIONS IN TORONTO AND OTTAWA.

Associations for the Care of the Feeble-minded have been formed in Ottawa and Toronto as Auxiliaries or branches of the Provincial Association for the Care of the Feeble-minded. The Toronto Association was formed on April 12th, 1916, largely as the result of the interest aroused by the National Welfare Exhibit in

connection with the Annual Meeting of the Canadian Conference of Charities and Correction, and the following officers were elected:—

Officers.

<i>Hon. President</i>	DR. HELEN MACMURCHY.
<i>President</i>	DR. C. K. CLARKE.
<i>Vice-Presidents</i>	MRS. A. M. HUESTIS AND DR. O. J. C. WITHROW.
<i>Treasurer</i>	PROF. T. R. ROBINSON.
<i>Secretary</i>	DR. GORDON BATES.

The Toronto Association, under the direction of the Executive Committee, proceeded at once to organize Standing Committees on Publicity, Policy and other important departments of work. The first report of the Policy Committee is as follows:—

POLICY OF THE TORONTO ASSOCIATION.

“As a necessary preliminary to action by this Committee before the Government the number of the Feeble-minded must be ascertained by inquiries conducted in the

- Public Schools.
- Private Schools.
- Separate Schools.
- High Schools.
- Children’s Institutions.
- Juvenile Courts.
- Redemptive Homes.
- Prison Homes.
- Penal Institutions.

CLINICS UNDER BOARD OF EDUCATION.

In connection with the Board of Education there is now legal power to establish temporary clinics in many school centres and to appoint as unpaid Inspectors men now on the staff of Toronto General Hospital, specialists on the subject of Feeble-mindedness who are in private practice and specialists who are at present members of the staff of the Board of Education, Medical Inspection Department.

REGISTRATION OF DEFECTIVES.

We recommend that all cases of defectives be recorded in a Confidential Register, under the Public Health Department of this city.

FARM COLONIES.

1. After ascertaining the extent of our problem, we should recommend the establishment of an Institution for the Feeble-minded on Farm Colonies plan, cottage style.
2. We should take a stand for local control, but provincial supervision.
3. Government grants on a per capita basis, per capita payments for outside patients being sufficient at least along with payments from outside communities concerned, to pay the total cost per inmate.

4. Expenses connected with the instructions given, including salaries of teachers, plant equipment, etc., should be borne by the Board of Education.

5. We recommend that these ends be sought by interviews with proper authorities and by an aggressive and sustained educational campaign to render these conferences effective. Also that this Toronto Branch pledge itself to study up-to-date literature on the subject of Mental Defectives, attending, whenever possible, clinics with a view to seeing our problems first-hand and with a view to acquiring knowledge of modern methods, so that in recommending Canadian Colonies the opinion of this board may be of real value.

It is further recommended that the physicians be requested to fit themselves to become specialists in the study of mental defects, as at present we have too few experts in this realm of science and that in the opinion of this committee there is great need for the establishment of a Clearing House, along the lines of the New York Clearing House for Defectives, and we as members are desirous of securing provision for the same."

This report was adopted by the Toronto Association.

OTTAWA ASSOCIATION FOR THE CARE OF THE FEEBLE-MINDED.

This Association is laying a good foundation for its future work. The following officers have been elected:—

President DR. J. H. PUTMAN.
Secretary DR. O. GLIDDON.

VOLUNTARY ASSOCIATIONS.

The influence of such Voluntary Associations in conducting educational campaigns, in enlightening and rendering effective public opinion and in securing early and adequate action by municipal, educational and other authorities is very great. Indeed, such associations are an indispensable part of any plan to secure the welfare of the mentally-defective and both in Great Britain and the United States they have done much to secure legislation for the benefit of the mentally defective and to advance their welfare in other ways.

CENTRAL ASSOCIATION FOR THE CARE OF THE FEEBLE-MINDED.

In England there were many such Associations in different parts of the country, and their assistance was considered so important by the Board of Control appointed under the Mental Deficiency Act of 1913 that one of the first duties to which the members of the Board gave attention was to secure the unification and co-operation of these Associations. This was happily arranged and the Central Association for the Care of the Feeble-minded was formed.

The first Annual Report of this Central Association in England appeared early in 1916. The energy, ability and public spirit shown by the Association under the leadership of its President, Mr. Leslie Scott, K.C., M.P., and its Honorary Secretary, Miss Evelyn Fox, have done wonders in the face of great difficulties, which they have met with undaunted firmness, doing what can be done now, and wisely waiting to do what can only be done in the future. It would seem that no department of the work has been neglected. Organization has been proceeded with, generous subscriptions having been given by the members.

Training, education, lectures, class work, special courses for teachers, the publication of pamphlets and the careful supervision of mental defectives have all received a share of the attention of the Association.

About the work of supervision the following brief statement is made:—

“One of the most important pieces of work a Voluntary Association can carry out at the moment is that of supervision. The Statutory authorities have power to keep defectives, who are subject to the Act under supervision in their own homes. Supervision to be efficacious means constant and careful visiting, and a really intimate knowledge of the life and characteristics of the defective. The work can be delegated by the Statutory authority to a Voluntary Association. As authorities are unable at present to borrow money to build and equip institutions for defectives, they can only send defectives to the very limited number of Homes and Institutions now in existence. The pressure on the available accommodation is so great that it is most important that only those defectives in urgent need of care and protection for their own sake or for that of others should be sent there. If the authorities would make full use of their powers of supervision, they would soon be in a position to know who should be cared for in an institution, and who might safely stop at home for a time. The Council urges the members not to relax in any way their efforts to care for defectives, saying that the acuteness of the position has been increased, rather than diminished, by the war, and it should be the duty of the members of the Association to keep the problem before the minds of all social workers, in order that still greater efforts may be made towards its solution.”

ADVISORY COMMITTEE *RE* CARE OF MENTAL DEFECTIVES IN TORONTO.

This Committee, appointed April 20th, 1915, to represent the Mayor, Board of Control and City Council, the Board of Education, the Charitable Institutions, the Local Council of Women and the Neighbourhood Workers' Association, continued its work during 1916, its last meeting taking place on October 10th. The members of the Committee are:—

Mr. Justice Osler, *Chairman*.

Controller Joseph E. Thompson.

Mr. J. K. Macdonald.

Chairman W. W. Hodgson.

Dr. C. J. Hastings.

Mrs. Huestis.

Mrs. Myers.

Rev. Lawrence Skey.

The Inspector of Feeble-minded, Secretary to the Committee.

An important conference took place between the Hon. W. J. Hanna, Provincial Secretary, and His Worship, Mayor Church, accompanied by all the members of the Advisory Committee, and others, on December 15th, 1915, when the Report of the Committee (see Tenth Report of the Feeble-minded, Ontario) and the whole question of the Care of Mental Defectives were discussed at length. Mr. Hanna undertook to lay the Report before the Government at an early date and to give consideration to the matter.

It is the general opinion that the work of this Committee has done a good deal to direct public attention to the matter, to hasten action, and to assist those who are endeavouring to find a solution to the question. References to the work of the Committee and its conclusions appeared from time to time during

the year and the proposals made by them appear on the whole to commend themselves to the people of the Province, as well as to the various important bodies whom the Committee represented. Two examples of this may be given.

On January 14th, 1916, a meeting took place in the Confederation Life Building, Toronto, to discuss the whole question of the Care of the Feeble-minded. The occasion was the reception of the Report of the Advisory Committee on this subject. (See Tenth Annual Report of the Feeble-minded, Ontario.)

The meeting was largely attended by representatives of the City Council, Board of Education, Children's Aid Society and Directors of the Public Charities, Local Council of Women, Social Service Commission and others who had appointed representatives to the Advisory Committee. The report was unanimously approved and a Resolution was passed to that effect.

HON. MR. HANNA'S ADDRESS.

In an address given before the Civic Improvement League of Canada at Ottawa, on January 20th, 1916, the Hon. W. J. Hanna said:—

“The question of defective children is a most pressing question in this Province and in the Dominion—a question full of importance in relation to the class of people we are going to grow and turn out in this Dominion; a mighty question. A Committee headed by Mr. Justice Osler has been following the question in Ontario and is doing work that, I am sure, will result in something worth while from the municipalities, aided by the Province.”

NATIONAL WELFARE EXHIBIT.

In connection with the Annual Meeting of the Canadian Conference of Charities and Correction, held at Toronto, March 28th and 29th, 1916, careful consideration was given to the question of proper care for mental defectives and the many problems of social welfare arising from it. In particular it was determined that a National Welfare Exhibit should be held dealing with the subject of Mental Defectiveness.

An Exhibit Committee was appointed and organized into Sub-committees and the work was taken up by them with such understanding and energy that with the assistance of the Toronto Board of Education, the Advisory Committee *re* Mental Defect, and others, not only was the Exhibit assembled and arranged for the week of the Conference, March 28th to April 1st, but by the assistance of the Bureau of Municipal Research, the Press and the members of the Committee, the general public was interested and the Exhibit Rooms were thronged from 10.00 a.m. to 10.00 p.m. A series of addresses was given to large audiences every afternoon and evening and additional interest was aroused by educational moving pictures supplied by the Pathescope Company.

Perhaps the most influential of all the plans of the Committee was the presentation of a short play illustrating clearly the life of a mentally defective family, their incapacity, errors and misery and offences against the community, and on the other hand the consequences of the utter neglect of that family by the community and all that it involved. This play was written by one of the members of the Committee, Miss Mary Joplin Clarke, Head of the Central Neighbourhood House, who also, with the assistance of some fifteen ladies and gentlemen, as *Dramatis Personae*, made all the arrangements for the presentation of the play. It was a great success and, as has already been said, had a marked

influence on all who saw it, even those who were already familiar with the truths thus strikingly presented. The play is entitled "Mental Milestones, a Twenty Minute Dramatic Sketch Presenting Some Aspects of the Problem of Feeble-mindedness."

The Exhibit was opened on the afternoon of Tuesday, March 28th, by His Honour the Lieutenant-Governor of Ontario, Sir John Hendrie, and addresses were given during the week by Dr. C. K. Clarke, Dr. Peter Bryce, Ottawa; Major Brunton, Hon. Featherstone Osler, Rev. Lawrence Skey, Miss Brooking, Mrs. A. M. Huestis, Dr. Horace L. Brittain, Mr. J. K. Macdonald, Mrs. Margaret H. Kerr, Canon H. P. Plumptre, Principal Chas. G. Fraser and the Inspector of Feeble-minded.

A corps of Guides, organized by Miss E. M. Paul, Superintendent of School Nurses, assisted by other members of the Committee, explained the various Exhibits to the visitors and added much to the success of the Exhibit.

EXHIBITS.

Industrial Institutions: There was a large exhibit of the different kinds of work done by the feeble-minded inmates of the various industrial institutions throughout Ontario. The inspection of this work was a revelation to those who have not previously had an opportunity of seeing what can be accomplished by mental defectives when well cared for and under supervision.

The Board of Education provided the following exhibits:—

1. Reproductions of two homes. Under the direction of the Medical Inspection Department of the Board, a city home and a country home were duplicated—the furniture in these reproductions being obtained from actual homes producing mental defectives. The Salvation Army greatly assisted the Board of Education to replace the furniture taken from the original homes.

2. An interesting chart which shows the history of the famous Kallikak family. This is the work of one of the school nurses, Miss H. K. Denison.

3. Photographs and other material.

In addition to these exhibits, the Board of Education largely assisted the exhibit by the loan of screens, flags and other decorations, and the services of members of the staff were placed at the disposal of the Committee.

An exhibit was shown of work done by children in the Auxiliary Classes of the Ontario Public Schools.

The Psychiatric Department of the Toronto General Hospital had a section where some of the results of their examination of nearly 1,000 cases of mental deficiency were shown, together with various tests used in making diagnoses of these cases.

Many individuals and organizations contributed freely and unselfishly of their time and energy in their endeavour to make this first "National Welfare Exhibit" a success. Although it is impossible to list all these, the management of the Exhibit appreciated fully their great services to the cause.

THE PSYCHIATRIC CLINIC.

The Social Service Clinic at the Toronto General Hospital, now known as the Psychiatric Clinic, which has been a great aid to social workers, teachers, physicians, to the Commissioner of the Juvenile Court and to the Charitable Institutions of the City, who have been perplexed with one or other of the many

problems relating to mental defectives, has done much important work this year. The following figures will give some idea of this:—

Total number of patients attending clinic	885
Total number of new cases attending clinic	643
Total number of old cases attending clinic	242
Total number of visits made	1,312

Classification of new patients:—

Insane	173
Idiots	20
Imbecile	171
Moron	262
Epileptic	25
Backward	124
Normal	110

In addition special attention has been paid to Dementia Præcox and to the emotional reactions found in these cases. A Psychological Laboratory was established at the University of Toronto in October, 1916, which is working in connection with the Psychiatric Clinic, its function being to investigate in an intensive manner certain selected cases from the Clinic. This Laboratory is supported partly by the University of Toronto and partly by the Toronto Association for the Care of the Feeble-minded.

Another important departure in the work of this Clinic during the year is the investigation made in regard to Specific Disease. In all suspicious cases the Wassermann Reaction has been taken. The following table gives the result:—

Total number of patients with positive Wassermanns, who have attended the Psychiatric Clinic, 81. Of these, 38 were under 16 years of age.

Nationality of cases:—

English	35
Canadian	23
Russian	6
Irish	5
Scotch	4
American	8

The work of such a Clinic as this, under various names, such as Clearing House Clinic, Central Clinic or Psychological Clinic or Laboratory is of great importance. Attention has been directed by Dr. C. K. Clarke, Dr. Hincks and others to the fact that in addition to the great problems connected with mental defect, the problem of juvenile insanity demands attention at this Clinic and elsewhere.

About eight per cent. of the total number of children sent to the Clinic as possible cases of mental defect were found to be suffering from early insanity. It is to be hoped that the medical inspection of schools and the co-operation of the School Physician with the School Nurse, the home and the teacher, will in the near future, help to prevent the development of insanity in children who might, without careful preventive treatment, develop it. The premonitory signs of insanity may often be recognized in childhood, and a good deal may be done by way of prevention. The opinion of Dr. F. W. Mott, a great authority, is that insanity which appears in middle or later life in the first generation, tends to appear in adolescence in the second generation and earlier still in the third.

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